DOCUMENT RESUME

ED 201 561 SO 013 308

AUTHOR	Klenzman, Elizabeth; Taylor, Paula
TITLE	Creating Futures Activity Cards and Teacher Guide.
INSTITUTION	Minneapolis Public Schools, Minn.
SPONS AGENCY	Minnesota Council on Quality Education, St. Paul.
PUB DATE	79
NOTE	244p.
AVAILABLE FROM	Federal Programs Department, Minneapolis Public Schools, 807 Northeast Broadway, Minneapolis, MN 55413 ($9.75 plus $2.00 billing charge if payment does not accompany order).
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Art Activities; Change; *Creative Thinking; Decision Making; Elementary Secondary Education; *Futures (of Society); Interdisciplinary Approach; Language Arts; Learning Activities; Mathematics; Planning; Problem Solving; Social Studies

ABSTRACT

Teachers can use these learning activities to teach about the future in elementary and secondary social studies, science, math, language arts, and arts courses. The purpose of the activities is to help students practice creative-thinking skills, investigate problems relevant to their personal futures, experience the concept of change, and evaluate alternatives and make decisions. The learning activities are presented on cards intended for student use. A teacher's guide accompanies the cards. Activity topics, which are color coded on the cards, are futurist's tools; personal futures; home, school, and community; populations; environment and transportation; energy; and future products and inventions. Each card lists materials, step-by-step directions, and discussion questions. Most of the activities are designed for individual students or small groups. Activities are many and varied. For example, students develop a time line of important things that have happened to them in their lifetime and then extend their time line into the future. Students trace the history of their school and chart the changes that have occurred since their school was built. In other activities, students plan a house of the future, make a family tree, analyze census records, do an experiment with snow to see how clean it is, and make a chart comparing different modes of transportation and fuel consumption. (Author/RM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED201561

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Creating Futures

Activity Cards & Teacher Guide

by

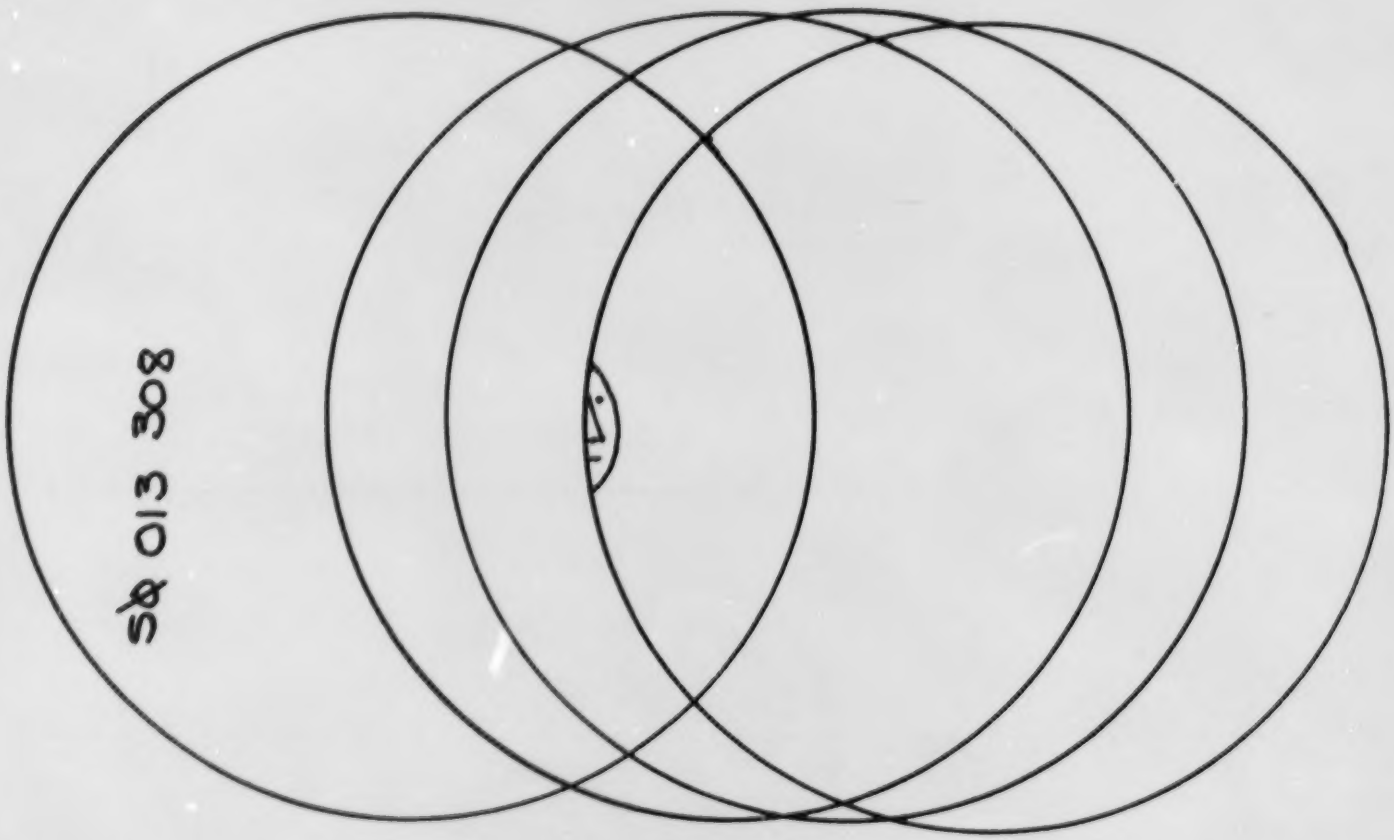
Elizabeth Klenzman & Paula Taylor

with funds provided by

MINNESOTA COUNCIL ON QUALITY EDUCATION

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Paula Taylor

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."



SP 013 308

"I am vitally interested in the future, because I am going to spend the rest of my life there." Charles F. Kettering

Minneapolis Board of Education
Marilyn A. Borea, Chairperson

W. Harry Davis | Carol R. Lind | John M. Mason
Philip A. Olson | James W. Pommerenke | Jane A. Starr

Superintendent of Schools
Raymond G. Arveson

Special School District No. 1

MINNEAPOLIS PUBLIC SCHOOLS

MINNEAPOLIS, MINNESOTA

An Equal Opportunity School District

1979

© Copyright 1979 by Minneapolis Public Schools

Teacher Guide

Why Study the Future?

"If the human race is to survive, it will have to change more in its ways of thinking in the next twenty-five years than it has done in the last twenty-five thousand." Kenneth Boulding

---

"Life in the twentieth century is like a parachute jump. You have to get it right the first time." Margaret Mead

---

We are living in an era of rapid change. Our parents and grandparents witnessed the switch from horse and buggy to automobile; from wood-burning stoves to microwave ovens; from fragile biplanes to rockets and space shuttles. Our children may encounter changes that are even more startling. The rate of social and technological change which we have undergone during the past fifty years is likely to continue or even to increase. During the next thirty years, the scope of change may equal that experienced in the past two or three centuries.

Most of us find it difficult to cope with rapid change. Sometimes we feel as though the world has been turned upside down. The job which looked so secure is suddenly abolished. The marriage which was intended to last a lifetime ends in divorce. The home where we hoped to raise our children and welcome our grandchildren turns out to be only one in a succession of temporary addresses.

Human beings have always had to adjust to certain inevitable changes, such as the addition of new family members through birth and the loss of others through death. However, these major life changes were previously

played out against a backdrop of permanence. People lived all their lives in or near the place where they were born. The world was small and cozy and familiar. At each stage of their lives, people knew exactly what to expect and what others would expect of them.

Today, we search in vain for any sort of permanence. Everyone and everything seems to be changing. We are bombarded with novelty -- new products ranging from breakfast cereals to supersonic aircraft; new ideas resulting from world-wide communications and transportation networks; new kinds of choices, such as whether or not to have children. Most painful are the changes in our values. In the course of a single generation, lifestyles and values have diverged so rapidly that parents and children barely understand one another. As Margaret Mead once remarked, "A person is born into one kind of world, grows up in another, and, by the time his children are growing up, lives in a still different world."

Most of us have difficulty coping with rapid change because, consciously or unconsciously, we expect things to stay the same. When nothing does, we feel anxious and disoriented. We begin to dread the future and to feel that things can only get worse. Or we become fatalistic, feeling that the future is completely unfathomable and that there's nothing we can do to alter or prepare for it.

Negative attitudes toward the future can be terribly damaging. Researchers are still not sure which types of change are most disturbing to humans, and they're not positive how fast the rate of change must be before it affects us. However, they do know that change and mental health are closely linked and that people with optimistic views of the future seem best able to cope with changes in their lives.

In order to achieve this kind of optimism, we need a new sort of

perspective. First of all, we have to learn to see change as constant and on-going -- a normal occurrence, rather than an aberration. We have to see people, organizations, and relationships as constantly growing and evolving -- not in a state of being, but in a process of becoming. Instead of being surprised by change, we must expect it.

Also, we must expand our time frames. For most of us, time stops at the present. We can picture the past clearly, but the future seems vague and ephemeral. We have tangible links to the past. A flower, a bar of music, a whiff of perfume can send our minds racing backward, reconstructing a whole network of personal experiences. Older people, treasured heirlooms, and family customs provide other important ties. Stories, music, museum artifacts, works of art all help form a picture of long ago which is nearly as vivid as the past we have personally experienced.

Our connections with the future are much more tenuous. Everyone has lived in the past, but no one has experienced the future. There are no museums where we can examine future artifacts or art galleries where we can view tomorrow's paintings. The past provides solid and substantial evidence of its existence -- things we can see, hear, and touch. But the future remains a vision which constantly eludes us.

We can delineate the past with a degree of certainty which is impossible with the future, for the past is the province of knowledge and fact, while the future belongs to the realm of imagination and speculation. It's possible to check the evidence, compare notes and come to an agreement about what <u>has</u> happened. But we can never be sure what <u>will</u> happen. The past is a broad river, carrying us all along together, but the future branches out into a multitude of smaller tributaries, taking us in different

directions.

Most of us have been discouraged from following the small tributaries of individual thought. We've been taught to believe in facts, not visions. As we grew up, we were required to squelch our fantasies and adjust to the "real" world -- the world of the past. But now that world has become a Wonderland where Cheshire cats appear and disappear, Mad Hatters hold tea parties, and we, like Alice, struggle to make sense of it all.

We can no longer rely entirely on the past for clues in deciphering the future. The world is changing so rapidly, we can no longer assume that tomorrow will resemble yesterday and the day before. The future has become disengaged from the past and is racing toward us at an ever-increasing rate of speed. In order to keep from being bowled over by an on-rushing future, we must meet it head-on -- on its terms. We can no longer afford to suppress divergent thinking. Instead of seeking only "right" answers, we must be willing to experience the complexity and ambiguity of the creative process. We must encourage people to speculate freely -- to play with ideas and toy with possibilities. In a world that is changing, we need to make use of imagination and vision in order to survive.

"When your children cease to dream dreams and have no vision of the future, your nation will fall." Fred Polak

---

Goals

"The future is both a subject and a perspective." Alvin Toffler

The Creating Futures Activity Cards create an environment that gives students the opportunity to:

* practice creative thinking skills.
* apply these skills in investigating problems relevant to their personal futures and to the future of their families, friends and communities.
* experience the concept of change in concrete terms.
* become acquainted with methods of anticipating change.
* practice evaluating alternatives and making choices.
* take concrete steps toward bringing a desirable future into being.

"Some men see things as they are and say 'why?' I dream of things that never were and say 'why not?'" George Bernard Shaw

Using the Cards

Format of the Cards

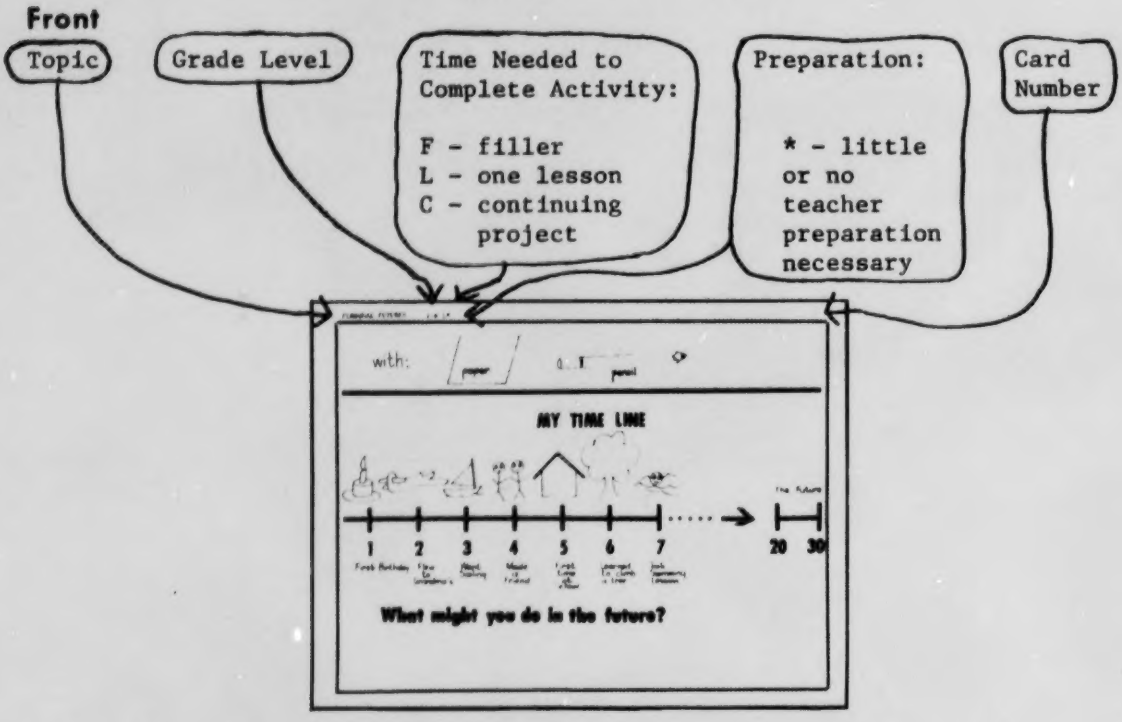
Topic

Topic is indicated by color:

Futurist's Tools	bright yellow
Personal Futures	white
Home, School & Community	salmon
Populations	blue
Environment, Transportation	cherry
Energy	light yellow
Future Products & Inventions	green

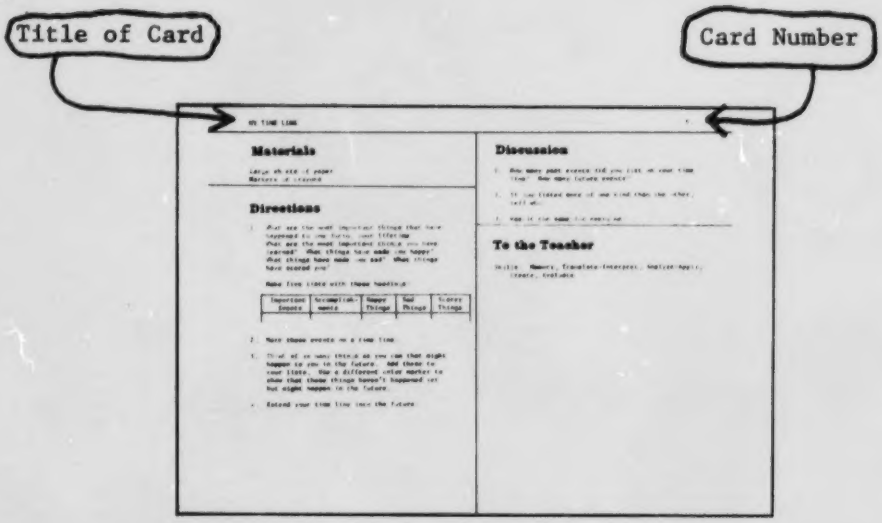
Topic headings also appear on the front of each card.

Front



Except for the coding at the top, the front of each card is for students. This side of the card presents cartoon characters demonstrating an activity and pictures materials needed to complete it.

Back



The back of each card lists materials, step-by-step directions, discussion questions, and more ideas for students interested in exploring further. Most of the activities are designed for individual students or small groups. However, the entire class can participate in the discussion, which is designed to follow the activity unless noted otherwise. Students working on their own can write answers to discussion questions, but these questions are often controversial and are more interesting when debated in a group.

The "To the Teacher" section contains a list of skills used in performing the activity, notes regarding background material and/or teaching suggestions, and additional resources such as books, games and films, coded as to level of difficulty (E-easy, I-intermediate, H-high school). The skills correspond to the categories in Bloom's Taxonomy. A complete, annotated list of books and other information sources can be found on page 17 of this teacher guide.

How Can the Cards Be Used?

Futures Unit

Select as many of the cards as you wish to use. For suggestions on introducing the study of the future, see page 9.

Mini-Unit on a Particular Aspect of the Future

Select one of the topic areas -- or a theme of your choice.

Other Subject Areas

Although the cards are cross-disciplinary in approach, they can easily be used in specific subject areas:

Social Studies .... Personal Futures; Home, School & Community; Environment, Transportation; Future Products & Inventions

Science ..... Populations; Environment, Transportation; Energy; Future Products & Inventions

Mathematics ..... Populations; Energy

Language Arts ..... Home, School & Community; Future Products & Inventions

Arts ..... Home, School & Community; Future Products & Inventions

Where to Start

"Tell me what your vision of the future is, and I will tell you what you are." Edward di Bono

You may wish to use one or several of these suggestions to introduce you class to the study of the future or as group exercises at various points along the way.

Your Future

Encourage children to think about their personal futures. Have older children describe themselves and their situations by listing five or more statements describing themselves fifteen years from now. Ask younger children to draw pictures of themselves fifteen years from now and tell what their lives might be like.

A unit on Personal Change might be presented as follows:

Infancy

Begin with a circular view of life by reading the book, A Time to Die, which describes the influence of a mother/grandmother on the lives of family members. Continue by discussing changes a family experiences when a baby is born. Focus on the changes experienced by the infant, as well as those felt by other family members. The book, A Child is Born and movie, The First Days of Life can be used to spark discussion.

Early Childhood

Have children indicate on time lines where they said their first sentence, where they learned to walk, where they remember something sad

or happy occurring. Have children play the roles of two-year-olds in a sand box. Discuss changes in early childhood.

School Years

Help children recall their first experiences at school by reading the first chapter of the book, Did You Carry the Flag Today, Charlie? Discuss their feelings about school then and now. Have their feelings about their teachers, classmates and schoolwork changed? Do they prefer being the youngest or the oldest -- discuss physical changes. Finally, have the children indicate on their time lines their plans for further schooling: junior high, high school, college.

Adult Years

Through drawings, "living sculptures," and group discussions, examine the major choices people make as adults: life style, type of family, parenthood, career.

Old Age

Discuss stereotypes; physical changes in vision, hearing and balance; options available in housing, employment, and support services. Role-playing game: have children attempt to give a party wearing foggy glasses and splints on their fingers, simulating some of the handicaps of old age.

To continue a unit on personal futures, have students complete cards 6-9.

Futurist's Tools

The "tools" described on cards 1-5 are used in many of the cards which follow. Be sure to practice these techniques in a group at the beginning of your study of the future so that everyone is familiar with them.

Creative Thinking

In thinking about the future, creativity is extremely important.

The Creative Thinking Process:

I. Ideation -- Produce as many and as varied ideas as possible. Do not judge or value any idea -- just record them.

II. Evaluation -- From among the many ideas produced, select those which seem most feasible, valuable, original, etc.

Imagination and judgment are equally important parts of the creative process, but they should not be used at the same time. The greatest quantity of original ideas results when these two modes of thinking are kept separate and used one at a time. Only after assembling as many ideas as possible (essentially as many as time allows), should one attempt to evaluate any of the ideas in any way.

Aids to Ideation:

1. Withhold judgment. Don't criticize any idea -- yours or anyone else's. At this stage, ideas are not good or bad, right or wrong -- they're just ideas.

2. Keep the ideas flowing. Try to produce as many as possible.

3. Feel free to elaborate on ideas already produced. Use Osborn's check-list to make sure you consider all possibilities. (Card 1.)

4. Make use of random associations. Open the dictionary. Write down the first word you see. Then open it to another page. Try to associate the two words and find out if these associations have any bearing on the problem you're trying to solve.

5. Give yourself enough time. Often the most original ideas are produced during the second half of a creative session -- after habitual thought patterns and associations have been exhausted. Don't stop when you don't seem to be able to think any more -- keep going. Your best ideas may be yet to come.

Warm-up exercise:

To practice these principles, have children sit in a circle. Pass a familiar object, such as a paper clip, around the circle and have each child tell what it could be used for -- or what associations it calls forth.

Trends

Make lists of things that are increasing or decreasing (i.e. trees, cars, people, oil, microwave ovens, clean air, wild animals). Discuss whether these trends are likely to continue. Identify factors which might speed up, slow down or reverse the trends. (See also card 2.)

Futures Wheel

A futures wheel is a method of tracing the consequences or implications of an event, an idea or a trend. Futures wheels help identify factors which might alter or limit a trend. Use futures wheels to assess wide-ranging effects of any topic under discussion.

For instructions on preparing a futures wheel, and a list of ideas to explore, see card 3.

FUTURES WHEEL

Suggestions:

1. Groups usually come up with more comprehensive futures wheels than individuals. The more diverse the group, the more complex and useful the wheel is likely to be.

2. Don't stop to discuss the ideas while you're preparing the wheel -- simply write down as many ideas as you can.

3. Try to list all first order effects first, then second order effects,

etc. This helps break the habit of thinking in a linear fashion and promotes associative thinking.

4. Sometimes you may be able to isolate an effect, but you may not be sure whether it's a 1st, 2nd or 3rd order consequence. To find out if there are any steps missing, ask "Can you think of anything that happens before that?"

5. Try to list both positive and negative consequences.

6. Limit the wheel to third and fourth order effects -- otherwise the scope becomes so broad as to be meaningless.

After you've prepared the wheel, discuss the consequences you've identified:

1. Decide whether the results are desirable or undesirable. With young children, simply mark each consequence plus or minus. With older students, rate each consequence from plus 3 (most desirable) to minus 3 (least desirable). Add the positives and negatives to find the overall value of the trend or idea.

2. Assess the likelihood of the results actually occurring. Rate the consequences on a scale of 0-5 (least likely to most likely). Total the numbers and divide by the number of consequences to get a rough estimate of the possibility of the trend's continuing.

Cross Impact Matrix

Helps clarify interrelationships between trends. Helps students see two-way relationships -- for instance, the trend toward more people affects the trend toward depletion of scarce resources, but depletion of resources also affects population growth.

Cross Impact Matrix

How Will This Affect This?	More People	Less Resources	More Pollution
more people	X	diminish available resources even faster	increase pollution
less resources	more competition for available resources	X	less money to fight pollution
more pollution	more people will get sick	more resources will be ruined by pollution	X

For instructions on preparing a cross impact matrix, see card 4.

Utopia

Have students describe in pictures or in words the kind of world they would like to live in when they grow up. List personal wishes, desires and goals, as well as general features of this ideal world. Cards 10-14 give specific suggestions on planning an ideal home, school, and community.

Planning Tree

How to get to utopia -- a way of tracing the steps necessary to reach a goal, while, at the same time, anticipating problems which might arise and alternative directions which might be taken.

For instructions on preparing a planning tree, see card 5.

Planning Tree
by a Sixth Grader

Scenario

To help students picture the future vividly, have them write, tell or dramatize stories incorporating the information gained from futures wheels, cross impact matrices and planning trees.

Futures Display

Keep a bulletin board on the future. Display articles telling about discoveries, inventions or predictions which have implications for the future. Ask children to think of all the ways the prediction or invention will affect their lives in the future.

Sources of Information

Books

NOTE: E - Easy, I - Intermediate, H - High School, A - Adult

Teaching Future Studies

H Clarke, Arthur, Profiles of the Future, Harper and Row, 1958.
Highly readable collection of essays on space, time, machine intelligence, future transport and communications.

A Kauffman, Draper, Teaching the Future, ETC Publications, 1976.
Practical book for teachers. Contains classroom exercises, teaching methods. Highly recommended.

A Toffler, Alvin, Future Shock, Random House, 1970.
Implications of rapid change.

A Toffler, Alvin, ed., Learning for Tomorrow -- The Role of the Future in Education, Random House, 1974.
Collection of essays on the teaching of the future and implications of rapid change for education.

Futurist's Tools

A Biondi, Angelo, ed., The Creative Process, D.O.K., Buffalo, 1972.
Good description of the creative process and suggestions for fostering creative thinking.

A Eberle, Robert, Scamper, D.O.K., Buffalo, NY, 1977.
Games to stimulate imagination. Can be used with all ages.

A Schaefer, Charles, Developing Creativity in Children, D.O.K., Buffalo, 1973.
A treasure trove of activities to stimulate imagination and creative thinking. All ages.

I The Strange & Familiar Series (Book III for elementary students), The Making It Strange Series (four workbooks for grades 3-6), SES Associates, 121 Brattle Street, Cambridge, MA 02138.
Exercises in applying creative thinking skills in many different subject areas. Excellent!

Personal Futures

E Bendick, Jeanne, Adaptation, Franklin Watts, 1971.
How did living things get to be so different? How do all of them adapt to their environments? Lots of "what if" questions.

E Bendick, Jeanne, The First Book of Time, Franklin Watts, 1963.
What is time and how do we measure it?

E Berger, Melvin, Time After Time, Coward McCann, 1975.
Biological clocks, measuring time.

I Burton, Virginia Lee, Life Story, Houghton Mifflin, 1962.
Putting geological and historical time periods in perspective.

H Nilsson, Lennart, A Child Is Born, Delacourt, 1977.
Striking photographic treatment of fetal development and the birth of a baby.

I Pringle, Laurence, Death Is Natural, Four Winds Press, 1977.
Explains how the death of living things, both plants and animals, makes life possible for succeeding generations.

I Wicker, Tom, A Time to Die, Time, 1975.
Describes the influence of a mother/grandmother on the lives of family members.

Home, School & Community

E Bendick, Jeanne, A Place to Live, Parents Magazine Press, 1970.
Environments and communities.

H Hellman, Hal, The City in the World of the Future, Lippincott, 1970.
Present trends in urban development and implications for the future. Includes scenerios, discussion of cities in the sea.

I Knight, David, Colonies in Orbit, William Morrow, 1977.
How space colonies might be constructed; what life might be like in space.

E-I Pringle, Laurence, City and Suburb -- Exploring an Ecosystem, Macmillan, 1975.
Changes within cities; how cities affect the environment.

E Ross, Pat, What Ever Happened to the Baxter Place?, Pantheon, 1976.
Story of how the Baxters' farm changes as the city creeps nearer and how the farm is finally subdivided and sold.

A Rudofsky, Bernard, Architecture without Architects, Doubleday, 1964.
Mostly pictures -- amazing structures and shelters built by "primitive" people. Fascinating.

I Millard, Reed, Clean Air - Clean Water for Tomorrow's World, Messner, 1972.
Covers both the pollution problem and the outlook for the future.

I-H Navarra, John, Our Noisy World, Doubleday, 1969.
Problem of noise pollution and possible solutions.

I Pringle, Laurence, Ecology, Science of Survival, Macmillan, 1971.
Traces the complicated inter-relationships of living organisms and their surroundings.

I Pringle, Laurence, The Only Earth We Have, Macmillan, 1969.
The environmental crisis -- what's happening and what we can do about it.

E Seuss, Dr., The Lorax, Random House, 1971.
Environmental problems explained at a level young children can understand -- but older children will also enjoy this.

Transportation

I Bendick, Jeanne, Space Travel, Franklin Watts, 1969.
What's out there; getting there; what it's like in space; speculations on future space exploration.

I Bova, Ben, Starflight and Other Improbabilities, Westminster Press, Philadelphia, 1973.
Speculations about our future activities in space.

I Hellman, Hal, Transportation in the World of the Future, M. Evans, 1974.
Future transportation -- by road and rail, in the air and under the sea.

Energy

I Adler, Irving, Petroleum -- Gas, Oil and Asphalt, John Day, 1975.
Petroleum -- how it's made; how we get it out of the ground; how we use it now and how it might be used in the future.

E Bendick, Jeanne, Why Things Work -- A Book About Energy, Parents Magazine Press, 1972.
Sources and kinds of energy; how energy changes; how we use it.

E-I Bendick, Jeanne, The Wind, Rand McNally, 1964.
What makes wind and how we use wind power -- also wind myths, sayings, sounds, smells, and "wind things."

E Berger, Melvin, Energy from the Sun, Thomas Crowell, 1976.
Solar energy -- new ways we can use energy from the sun.

Populations

I Pringle, Laurence, One Earth, Many People, Macmillan, 1971.
Interrelationship of people and resources. How many people can the earth support? How can we slow population growth?

I Pringle, Laurence, Our Hungry Earth -- The World Food Crisis, Macmillan, 1976.
World population growth -- how can we feed all the earth's people? What if there isn't enough to go around?

Environment

E Bendick, Jeanne, Ecology, Franklin Watts, 1975.
A simple introduction to the chain of life and other aspects of ecology -- ample illustrations, good thought questions, suggestions for experiments.

E Beame, Rona, What Happens to the Garbage?, Julian Messner, 1975.
Picking up the garbage, dumping it, recycling it.

E Bloome, Enid, The Air We Breathe, Doubleday, 1971.
The problem of air pollution and what we can do about it.

A The Dayton Museum of Natural History, The Do-It-Yourself Environmental Handbook, Little, Brown & Company, 1972.
Practical suggestions for reducing your personal contribution to pollution.

I Elliott, Sarah, Our Dirty Air, Messner, 1971.
Problem of air pollution, methods of prevention.

I Elliott, Sarah, Our Dirty Land, Messner, 1976.
Covers many aspects of pollution, including refuse disposal, strip-mining pesticides; includes activities children can initiate to help preserve the land.

I Elliott, Sarah, Our Dirty Water, Messner, 1973.
Problem of pollution, causes and possible solutions.

I Hilton, Suzanne, How Do They Get Rid of It?, Westminster Press, Philadelphia, 1970.
Problem of disposing of all kinds of waste, including old buildings, automobiles, sewage, containers, and radioactive materials; how trash can become a treasure.

E Hurd, Edith, Wilson's World, Harper, 1971.
Wilson likes to paint, so he makes a world of his own. Soon houses, cars, and smog change Wilson's world and the sun can no longer be seen.

E McCoy, Joseph J., Hunt for the Whooping Crane: A Natural History Detective Story, Lothrop, 1966.
A book recording the efforts of conservationists to save a nearly extinct bird.

H Dennis, Landt, Catch the Wind, Four Winds Press, 1976.
How windmills and windpower were used in the past; problems and possibilities of using windpower today and in the future. Lots of photos.

E Gans, Romas, Oil, The Buried Treasure, Thomas Crowell, 1975.
What is oil? Where does it come from? How is it used?

I How to Make and Fly Paper Airplanes, Bantam Books.

I Kiefer, Irene, Underground Furnaces -- The Story of Geothermal Energy, Morrow, 1976.
Geothermal energy resources; how we have harnessed these resources in the past; how geothermal energy might help meet future energy needs.

E Lefkowitz, R.J., Fuel for Today and Tomorrow, Parents Magazine Press, 1974.
Uses and misuses of today's fuels -- oil, gas, coal, atomic energy -- and possible fuels for the future, such as solar and geothermal energy.

E Pine, Tillie and Levine, Joseph, Energy All Around, McGraw Hill, 1975.
What energy is -- where it can be found -- where it comes from -- how we use it.

E-I Smith, Norman, Sun Power, Coward McCann, 1976.
How living things use energy from the sun; new ways to put sun power to work.

Future Products & Inventions

I Jones, Wyeman, Computer, the Mind Stretcher, The Dial Press, 1969.
How computers work.

I Kohn, Bernice, Communications Satellites, Four Winds Press, 1975.
How satellites are launched and kept in orbit; how they work; implications of satellite communication for the future.

E Lewis, Bruce, Meet the Computer, Dodd, Mead, 1977.
What computers do and how they work.

H Malone, Robert, The Robot Book, Harcourt Brace Jovanovich, 1978.
Robots -- past, present and future. Lots of photos.

I Rusch, Richard, Man's Marvelous Computer, The Next Quarter Century, Simon and Schuster, 1970.
Recent advances in computer technology, including lasers and holograms; ways in which computers will revolutionize life in the future.

I Simon, Seymour, Science at Work: Projects in Space Science, Franklin Watts, 1971.
Simple experiments, using everyday materials, demonstrating principles, such as weightlessness and gravity, and exploring problems, such as how a rocket works and how life can be detected on other planets.

Films

Dimensions of Change, Doubleday Multimedia, Box 11607, 1371 Reynolds Ave., Santa Ana, California 92705.
An outstanding series of six filmstrips with excellent supporting cassettes. Topics include ecology, shelter, energy, food, mobility and communications. Upper-grade students will enjoy the entire series. For younger children, for whom the sound track may be difficult, the pictures alone can be shown and discussed.

Games

Earth Game, World Future Society Book Service, 4916 St. Elmo Ave., Washington, DC 20014
A cooperative game about Spaceship Earth, Ages: 10-adult. Players: 2-6.

New Games Book, New Games Foundation, P. O. Box 7901, San Francisco, CA 94120
Cooperative games for all ages.

New Town (Family Game Version), World Future Society Book Service, 4916 St. Elmo Ave., Washington, DC 20014
Board represents space allocated for a new town; players build a viable community. Ages 8-adult. Players: 2-6.

Magazines

The Futurist, The World Future Society, 4916 St. Elmo Avenue (Bethesda) Washington, D.C. 20014. Edward Cornish, editor. Bimonthly, $15 per year.
A journal of forecasts, trends, and ideas about the future; largest circulation of any future-oriented journal.

Omni, Omni Publications International, Ltd., 909 Third Avenue, New York, NY 10022. Bob Guccione, editor. Monthly, $18 per year.
Includes both science fiction and non-fiction articles on all aspects of the future, including biology, transportation, oceanography, solar power, UFO's, space, genetic engineering, architecture, etc. Excellent photography and well-written articles aimed toward a general audience.

Popular Mechanics, First Magazines, 224 W. 57th Street, New York, NY 10019. Monthly, $7.97 per year.
Frequently includes articles on trends and future technologies -- a useful resource for upper-grade classrooms in the study of the future.

Popular Science, Times and Mirror Magazines, Inc., 380 Madison Avenue, New York, NY 10017. Monthly, $7.94 per year.
A useful resource for upper-grade classrooms in the study of the future.

Materials

Paper
Pencil

Directions

See what you can make out of a familiar object, such as a paper clip, a jacket, or a pencil by changing it in the following ways:*

1. Put it to other uses. (New ways to use as is? Other uses if changed in some way?)
2. Adapt it. (What else is like this? What other ideas does this suggest?)
3. Modify it. (Change the meaning, color, motion, sound, olor, taste, form, shape. Other changes?)
4. Magnify it. (Can you add something? Make it stronger? Larger? Add an ingredient? Multiply it?)
5. Minify it. (Can you subtract something? Eliminate something? Make it smaller? Lighter? Slower? Split it up?)
6. Substitute for it. (Who else instead? What else instead? Other place? Other time?)
7. Rearrange it. (Another layout? Another sequence? A change of pace?)
8. Reverse it. (Change it into its opposite? Turn it backward? Turn it upside down? Turn it inside out?)
9. Combine it. (How about a blend, an assortment? Combine purposes? Combine ideas?)

* This checklist was developed by A. F. Osborn.

Discussion

1. How many new objects or uses did you find?
2. Did any two people think of the same thing?

More Ideas

Refer to these books for other creative thinking activities:

Eberle, Robert, Scamper
Schaefer, Charles, Developing Creativity in Children

To the Teacher

Skills:
Create

Note: When using this card in a group, have each child perform one of the operations.

CREATIVE THINKING

Take something familar to you .....

Make it larger

Make it smaller

Reverse it

Rearrange it

Adapt it

Combine it

Substitute for it !

Materials

Paper
Pencil

Directions

1. Look in magazines or in the encyclopedia for pictures of things which are increasing or decreasing. See if you can find anything which has stayed the same.

2. Make three lists:

More	Less	Same

Discussion

1. Which list is the longest? Which is the shortest? Is it the same for everyone?

2. Why are these things increasing or decreasing?

3. Are they likely to keep on increasing or decreasing in the future?

4. Are the increases good or bad? How about the decreases?

5. Could we stop any of these things from increasing or decreasing? What would we have to do?

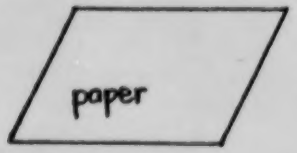
More Ideas

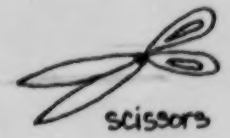
1. What might happen if things keep on increasing or decreasing at the present rate? Choose one of the items which is increasing or decreasing. Do a futures wheel (card # 3) to trace the consequences.

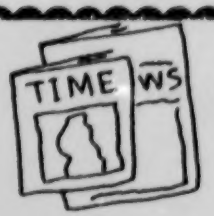
2. List three or four of the increases and decreases which are related to each other. Do a cross-impact matrix (card #4) to find out how these trends will affect each other.

To the Teacher

Skills:
- Memory
- Translate-Interpret
- Analyze-Apply
- Create
- Evaluate

with 





IDENTIFYING TRENDS

Materials

Large poster paper
Marker

Directions

1. Decide which idea, trend or event you wish to explore. For example:

   What would happen if there were:
   - no more oil
   - more underground houses
   - no more schools
   - fewer trees
   - more nuclear power plants

2. Write your idea in the middle of a large sheet of paper and draw a circle around it.

3. Draw a number of lines from the central circle. At the end of each, write a possible result stemming from the original idea. Circle these new ideas.

4. Continue this process with each of the new circles. Make sure each idea stems directly from the one before it, without any in-between consequences.

Hints:

1. List as many effects as you can.

2. Try to list both good and bad effects.

Discussion

1. Which results are most likely to happen? Rate each result on a scale of 0-5. (0-least likely, 5-most likely.)

2. Which results are good? Which are bad? Mark the good results with a plus. Mark the bad results with a minus.

3. What can we do to prevent the bad results? What can we do to make sure the good results happen?

More Ideas

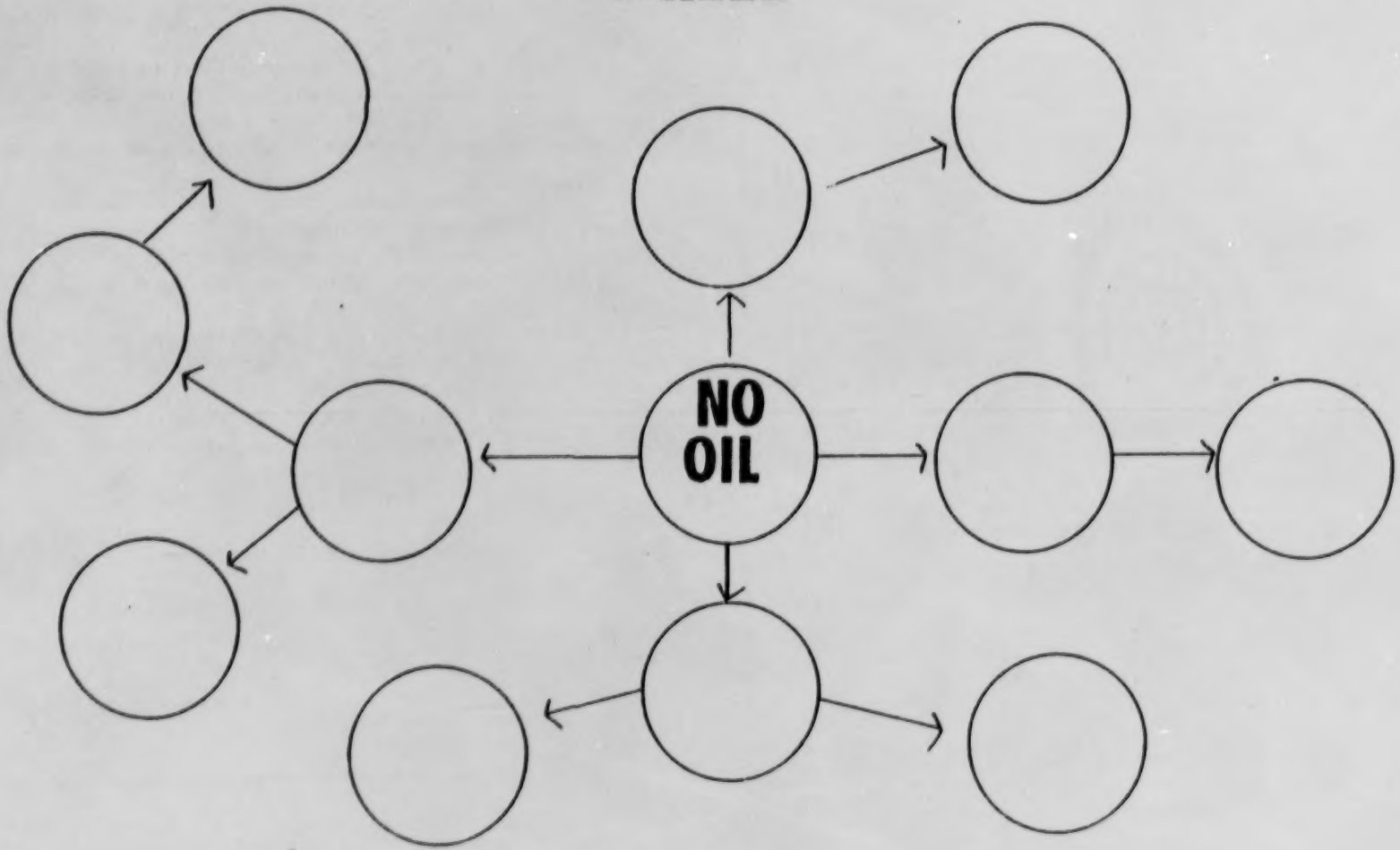
Try doing a futures wheel on one of these topics:

- using more solar energy
- " " wind power
- " " coal
- discovery of intelligent life in space
- cost of ground beef rises to $10 a pound
- long distance subway is built -- people can get from New York to Los Angeles in 21 minutes.
- a company begins selling parafoils (a safe, one-person aircraft that costs about as much as a motorcycle)
- gasoline costs $10 a gallon
- human brains can be linked with computers
- learning pills are available
- people live to be 800
- robots do all the housework
- building space colonies
- goodby, gravity...

To the Teacher

Skills: Memory Translate-Interpret Analyze-Apply

FUTURES WHEEL



What would happen if...

Materials

Paper
Pencil

Directions

1. Choose three things you would like to do.
2. List these activities along the side and across the top of a sheet of paper, as in the example on the front of the card.
3. Ask yourself how each activity on the top will affect those along the side. Write the answers in the appropriate boxes.

Discussion

1. Which activities were compatible? Which activities conflicted with one another?
2. Would you change your plans because of what you found out? What changes would you make?

More Ideas

1. Do another matrix using three or four related trends, such as:
   more cars, fewer buses, fewer passenger trains
   more people, less forest and marshland, less wild animals
   computers in the home, more adult education, more career changes
   more microwave ovens, families eat more meals in restaurants, more women work outside the home

   After completing the matrix, tell what you found out.
2. If these trends continue, how will they affect your future?
3. Is it possible to influence these trends to create the kind of future you want? Brainstorm for solutions and courses of action.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply

CROSS IMPACT MATRIX

HOW WILL THIS → AFFECT THIS ? ↓	I want to travel.	I want to swim better.	I want to go to college.	
I want to travel.		I will not be near a swimming pool.	If I travel, I might not have time to go to college.	
I want to swim better.	I might not be able to travel because of work-outs and swim meets.		I might have to go to swim meets during college.	
I want to go to college.	If I go to college I might not have time to travel.	I might have too much work to have time to swim.		

Materials

Paper
Pencil

Directions

1. Decide on your goal -- something you would like to:
   become (pro football player, concert pianist)
   have (new bicycle, shark's tooth necklace)
   do (get better grades, lose weight, have a picnic, make the swim team, travel to China)

2. Describe your present situation in a box at the bottom of your paper.

3. Work either forward or backward, listing the steps in between your present situation and your goal. If you have trouble thinking which steps come next, ask yourself, "What must happen immediately before the goal is reached?" Write this step just below your goal. Continue working backwards toward the present.

4. For each step, try to think of something which might conflict with this or prevent it from happening. List these conflicting events and also ways of getting around them, so that your tree branches out with detours which lead back to the main pathway or to alternate goals. Try to prevent dead ends.

Discussion

1. How many steps were needed to reach your goal?

2. Estimate the time it might take to reach your goal.

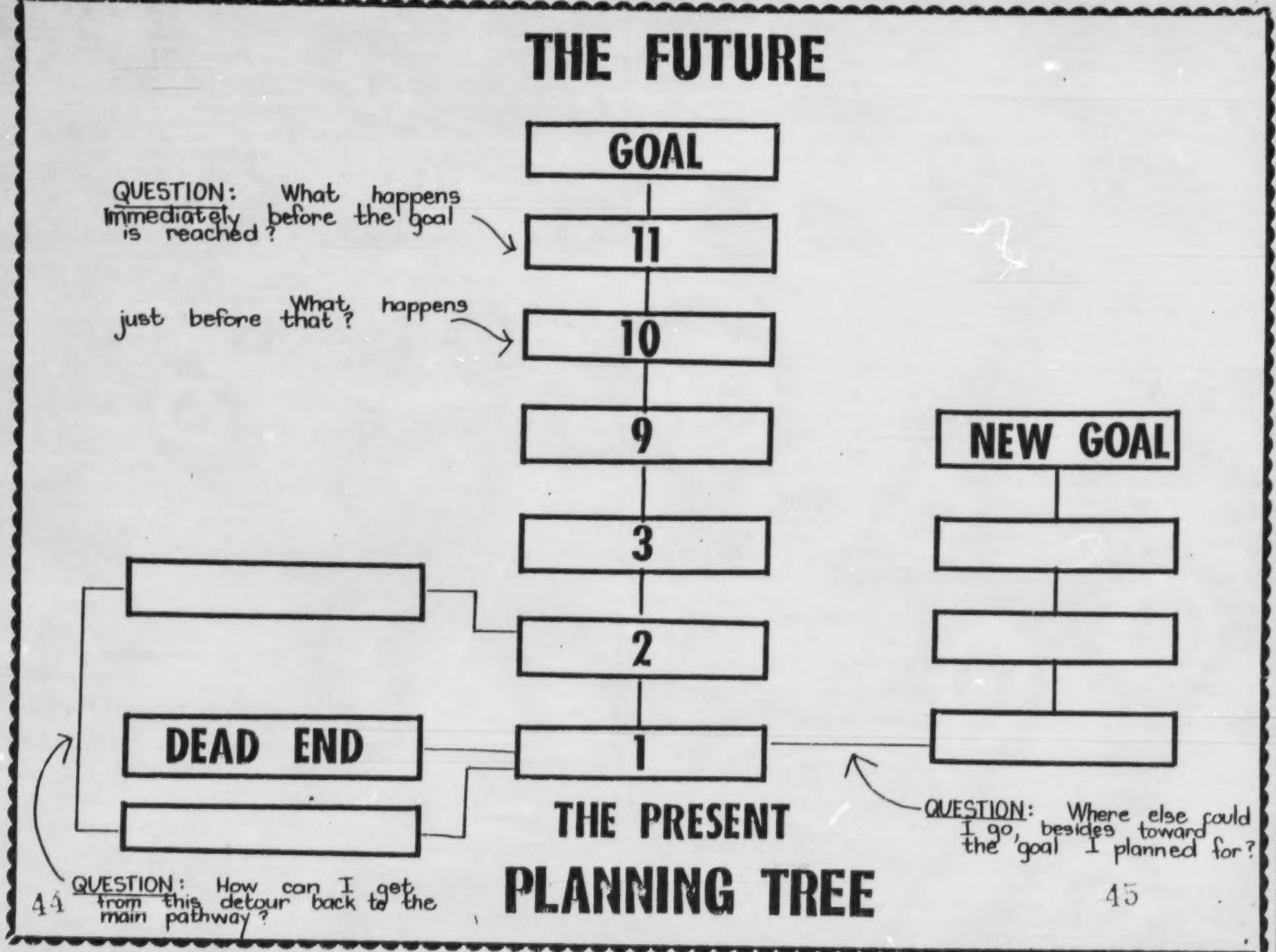
3. Did you think of any serious conflicts? Any new goals?

More Ideas

Use a planning tree to plan a project you could finish in a week or less. Estimate when you will complete each step. Check off each step as it's completed and note whether it was finished on time. Did you reach your goal on schedule?

To the Teacher

Skills: Memory, Analyze-Apply



Note: Material received from Futures Education Workshop, July 1978.

Materials

Large sheets of paper
Markers or crayons

Directions

1. What are the most important things that have happened to you during your lifetime? What are the most important things you have learned? What things have made you happy? What things have made you sad? What things have scared you?

   Make five lists with these headings:

Important Events	Accomplish-ments	Happy Things	Sad Things	Scarey Things

2. Mark these events on a time line.

3. Think of as many things as you can that might happen to you in the future. Add these to your lists. Use a different color marker to show that these things haven't happened yet but might happen in the future.

4. Extend your time line into the future.

Discussion

1. How many past events did you list on your time line? How many future events?

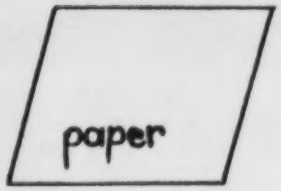
2. If you listed more of one kind than the other, tell why.

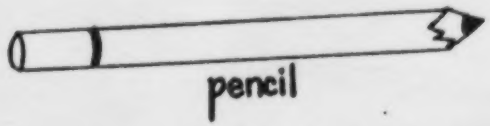
3. Was it the same for everyone?

To the Teacher

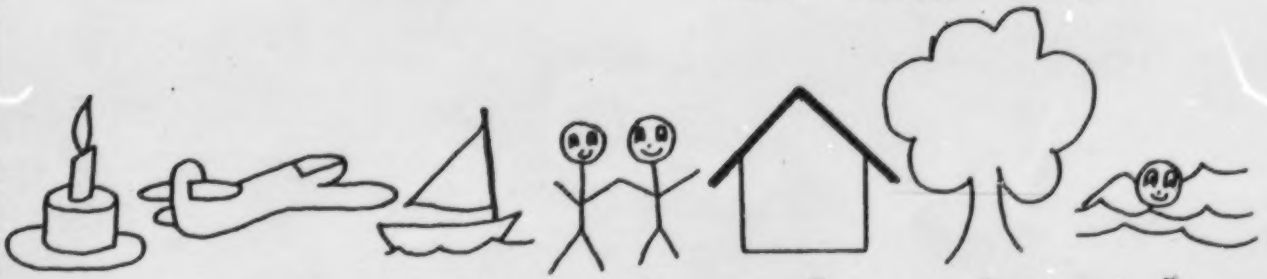
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with:





MY TIME LINE



The Future

1 2 3 4 5 6 7 20 30

1 First Birthday
2 Flew to Grandma's and Grandpa's
3 Went Sailing
4 Made a Friend
5 First time at School
6 Learned to climb a tree
7 Took Swimming Lessons

What might you do in the future?

Materials

Large sheets of paper
Old magazines and newspapers
Crayons
Scissors
Glue

Directions

1. Draw a picture of yourself or place a photo in the center of the page.
2. Make a list of all your needs.
3. Draw or cut out pictures representing these needs.
4. How old will you be 10 years from now? Put an X by the items you will still need then.

Discussion

1. List the needs that have to be met in order for people to stay alive.
2. List those needs which are not essential. Are these the same for everyone?

More Ideas

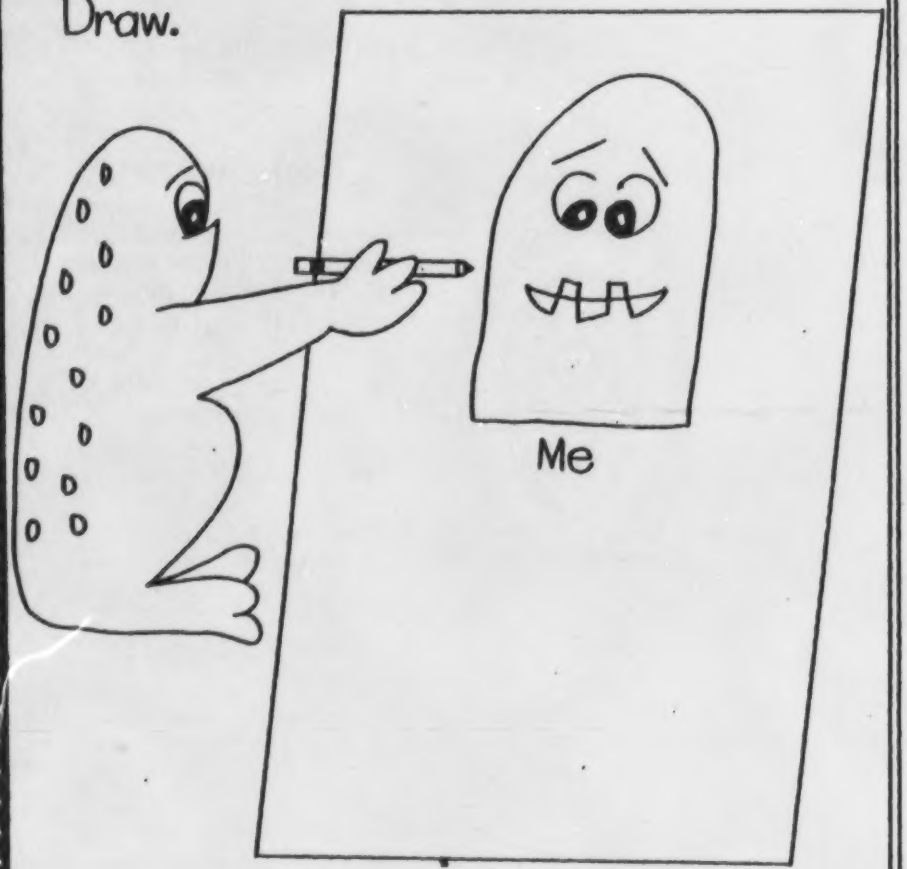
Tell how you get the things you need. Where do these things come from?

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

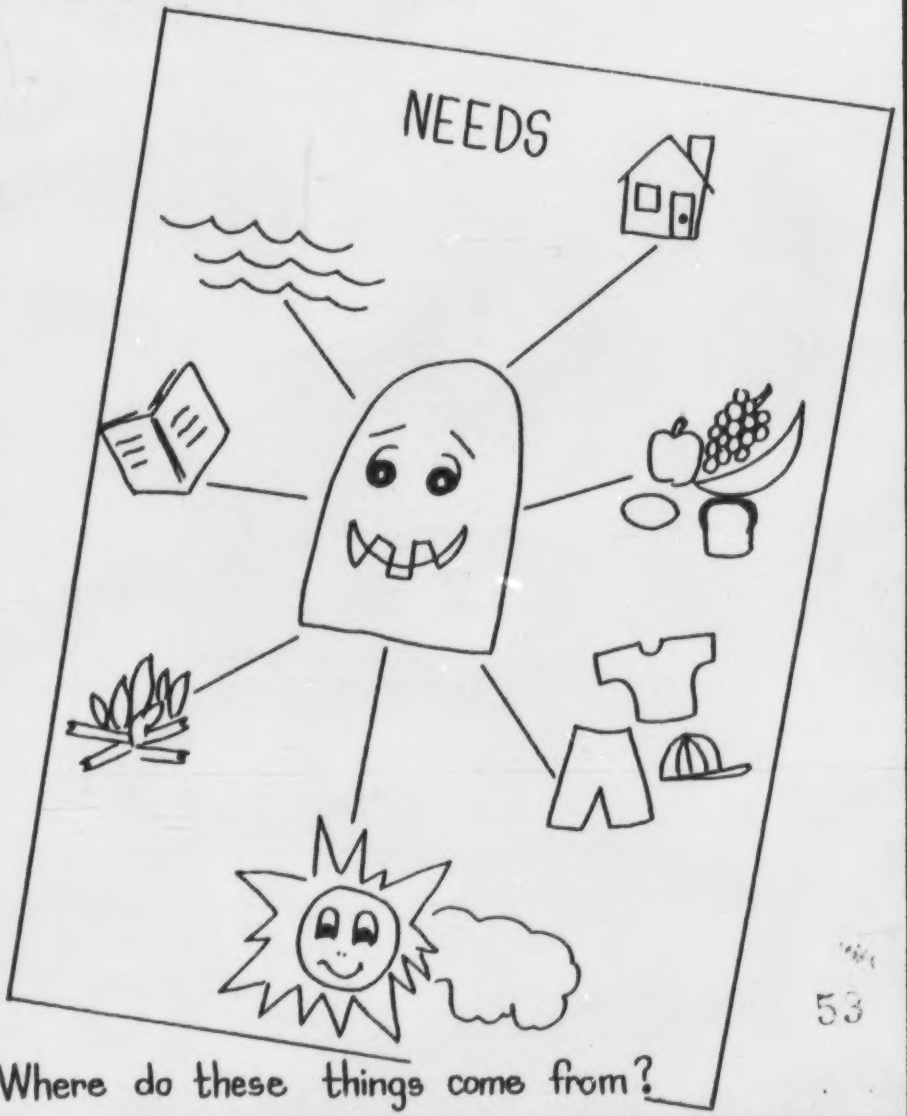
with: paper pencil LIFE old magazines glue scissors

Draw.



WHAT DO I NEED?

Draw or cut out.



Then.....Where do these things come from?

Materials

Large sheets of paper
Maps of the state, U.S. and world
Markers or crayons
(photos of other houses you've lived in)

Directions

1. On the map, show where your family has lived in the past and where you are living now. If you wish, you could also include other generations: grandparents, great-grandparents, etc.

2. Show where you expect your family to be in the future -- or where you would like to live when you're an adult.

Discussion

1. Take a survey of the class:
   How many students have never moved?
   How many have moved within the community?
   How many have moved within the state?
   How many have moved from one state to another?
   How many have moved here from another country?

2. When your parents were your age, had they moved more or less than you have? How about your grandparents?

3. Do families today move more or less than they did in the past?

4. Do you think families will move more or less often in the future?

5. How do you feel about moving?

6. Do you think your feelings will change in the future?

More Ideas

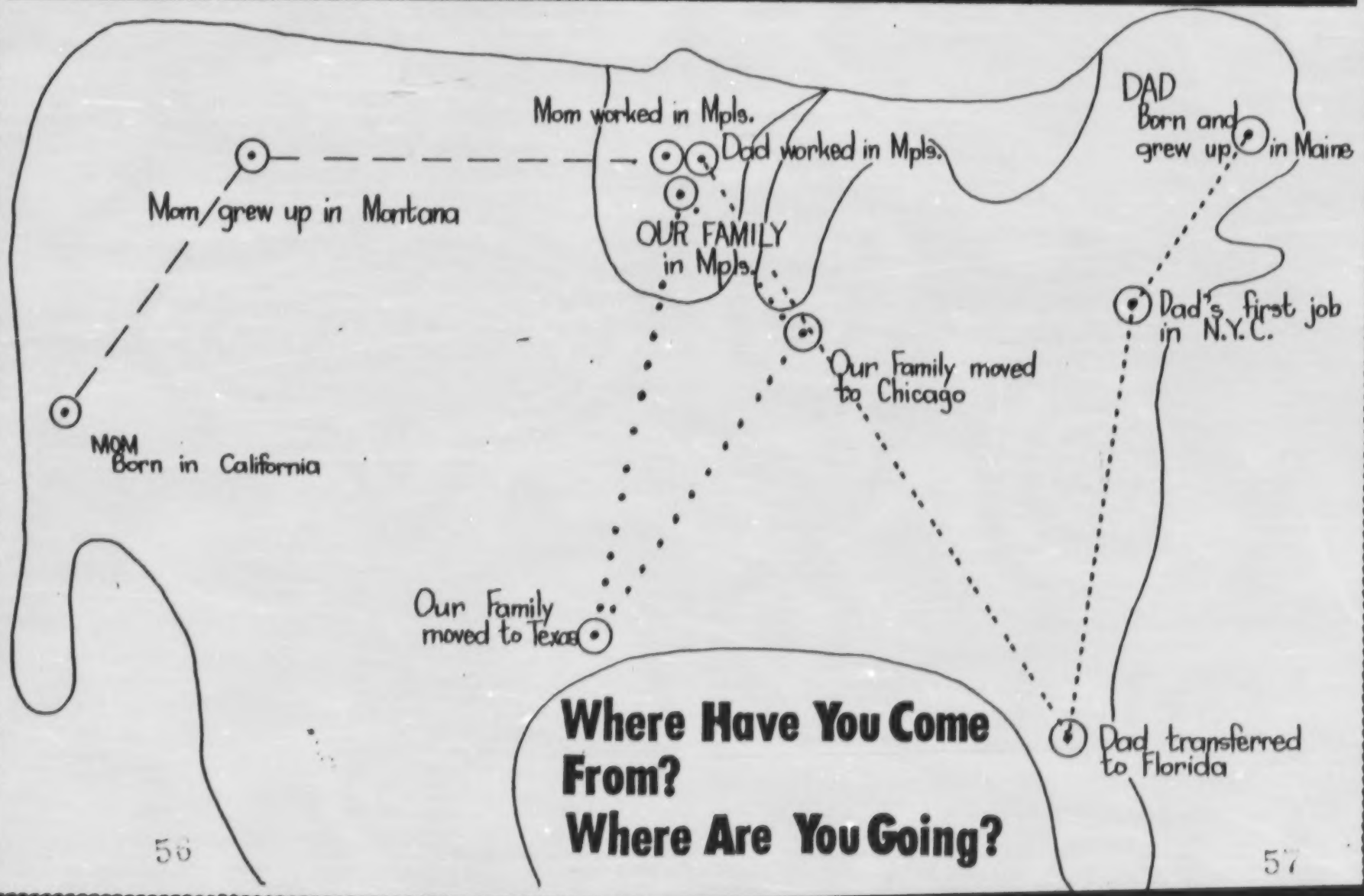
Write or tell about the place where you would most like to live when you grow up. Tell why you would like to live there.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: Provide each student with a map. With younger children, this activity should first be demonstrated with a large map. Children who have not moved can show where they have traveled.

with: maps markers crayons


Mom worked in Mpls.
Dad worked in Mpls.
DAD
Born and grew up in Maine
Mom grew up in Montana
OUR FAMILY in Mpls.
Dad's first job in N.Y.C.
Our Family moved to Chicago
MOM Born in California
Our Family moved to Texas
Dad transferred to Florida
Where Have You Come From?
Where Are You Going?

Materials

Paper
Pencil

Directions

1. List ten games.
   a. Ask your parents or grandparents if any of these games were only for girls or only for boys when they were your age.
   b. Who plays these games today?
   c. Who will play these games in the future? Make a prediction.

   Make a chart:

a GAMES: BOYS OR GIRLS?			
game	past	present	future

2. List ten jobs.
   a. Ask your parents or grandparents if these jobs were only for men or only for women when they were your age.
   b. Who does these jobs today?
   c. Who will do these jobs in the future?

   Make a chart:

JOBS: MEN OR WOMEN?			
job	past	present	future

Discussion

1. What do your charts tell us about changes in men's and women's roles?
2. How do you feel about this?
3. What effects have changing roles had on individuals? on families? on society?
4. What effects will changing roles have in the future?
5. What special needs of men/women will have to be met to prepare them for their future?
6. List all the jobs that women will do in the future that they do not do now. List the new kinds of jobs men will do in the future.

More Ideas

1. List all the new jobs which have been created in the last 10 years.
2. List all the jobs which will be needed in the future.
3. List all the jobs that will no longer exist.
4. Find examples from magazines and newspapers to illustrate changing roles.
5. Draw a picture of yourself working at a job which would surprise your parents.
6. Take a survey of your class. List all the different jobs people want to do in the future.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with: paper pencil

CHANGING ROLES?

60

61

Materials

Use a variety, such as:
Straws
Clay
Cardboard
Tin foil
Plastic wrap
Pins
Toothpicks
Wire
Scrap wood

Directions

1. Answer the discussion questions. Then plan a house of the future. Tell:
   - when you will build it
   - where you will build it
   - what materials you will use
   - how many rooms it will have
   - who will live there

2. Draw a floor plan or build a model of your future house.

Discussion

1. How many different kinds of houses can you think of: (Include houses animals build.) Make a list.

2. Tell why the builders of these houses designed them the way they did. Discuss:
   - shape of house
   - size
   - materials
   - climate

3. What would houses be like if:
   - we had no more oil?
   - we had no more wood?
   - there were no gravity?
   - every family were self-sufficient?
   - everyone worked at home?

More Ideas

1. Sometimes model houses have names. Give your house of the future a name.

2. Pretend you're selling your house of the future. Write an ad for a newspaper, magazine, radio or TV.

3. Write or tell a story describing a day in your house of the future -- or pretend to be your house.

4. Visit a geodesic dome home, a solar-heated home, an earth-sheltered home, etc.

5. Look at pictures of houses of the future designed by professional architects.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create

Show film: "Shelter" in Dimensions of Change series.
Display book, Architecture without Architects to spark idea

with: clay straws Foil plastic wrap wire cardboard

DESIGN THE HOME OF THE FUTURE

Materials

Old photos
Old newspapers
Maps
Books

Directions

1. Collect old photos of your community.

2. Find several senior citizens who are long-time residents of your community. Invite them to visit your class.

3. Discuss the old photos. With the help of the long-time residents, locate community landmarks on the old maps. See if you can find out:
   when the community was founded
   who the first settlers were
   why the location was chosen
   why the town grew as it did

4. Locate community landmarks on a present-day map of your town. Locate your house and school.

Discussion

1. List all the reasons why growth occurred in your community.

2. Discuss where growth may take place in the future.

3. Has your community's growth been good or bad?

4. Do you think your community should grow in the future?

5. Why do towns "die"? Is this likely to happen to your town?

More Ideas

1. Visit your local museum or historical society.

2. Visit your town's Chamber of Commerce. Find out how your town is promoting and encouraging growth.

3. Visit a planning session of your city government.

4. Write a letter to your mayor, describing your suggestions for planning your town's future growth.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: Reproduce an old map and a current map of your community for each student.

Read book, What Ever Happened to the Old Baxter Place? (E) as an introduction to this activity.

with:

newspaper

The way it . . .

Was . .

Is . . .

Might Be . . .

63

63

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Sketch pad (checklist)
Pencil
(Camera)

Directions

1. Take a walk around your neighborhood to see what is happening:
   a new store?
   a store closing?
   a new home?
   a new addition?
   a new coat of paint?
   more dogs? more cats?
   fewer trees?
   more children? fewer children?
   other changes?

2. Make a list of all the changes -- in pictures or in words.

Discussion

1. If you found a lot of changes:
   a. How many of the changes were good? How many were bad?
   b. Tell what your neighborhood would be like 10 years from now if these changes continued.
   c. How do you picture the ideal future community? List things that could be done to make your neighborhood like this.

2. If you didn't find many changes:
   a. Are there any changes you would like to make in your neighborhood?
   b. List all the changes that might take place in the future. Tell what would cause these changes.
   c. Which changes would be good? Which would be bad?
   d. What can be done to prevent the bad changes and make the good ones happen?

More Ideas

How would your neighborhood change if:
the number of people living there doubled?
gasoline cost $10 a gallon?
nearly every family needed two wage-earners?
housing prices doubled?

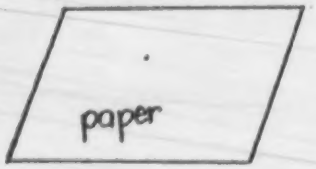
To the Teacher

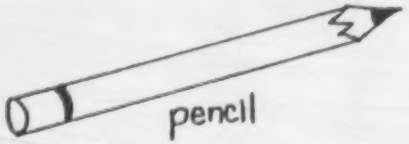
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

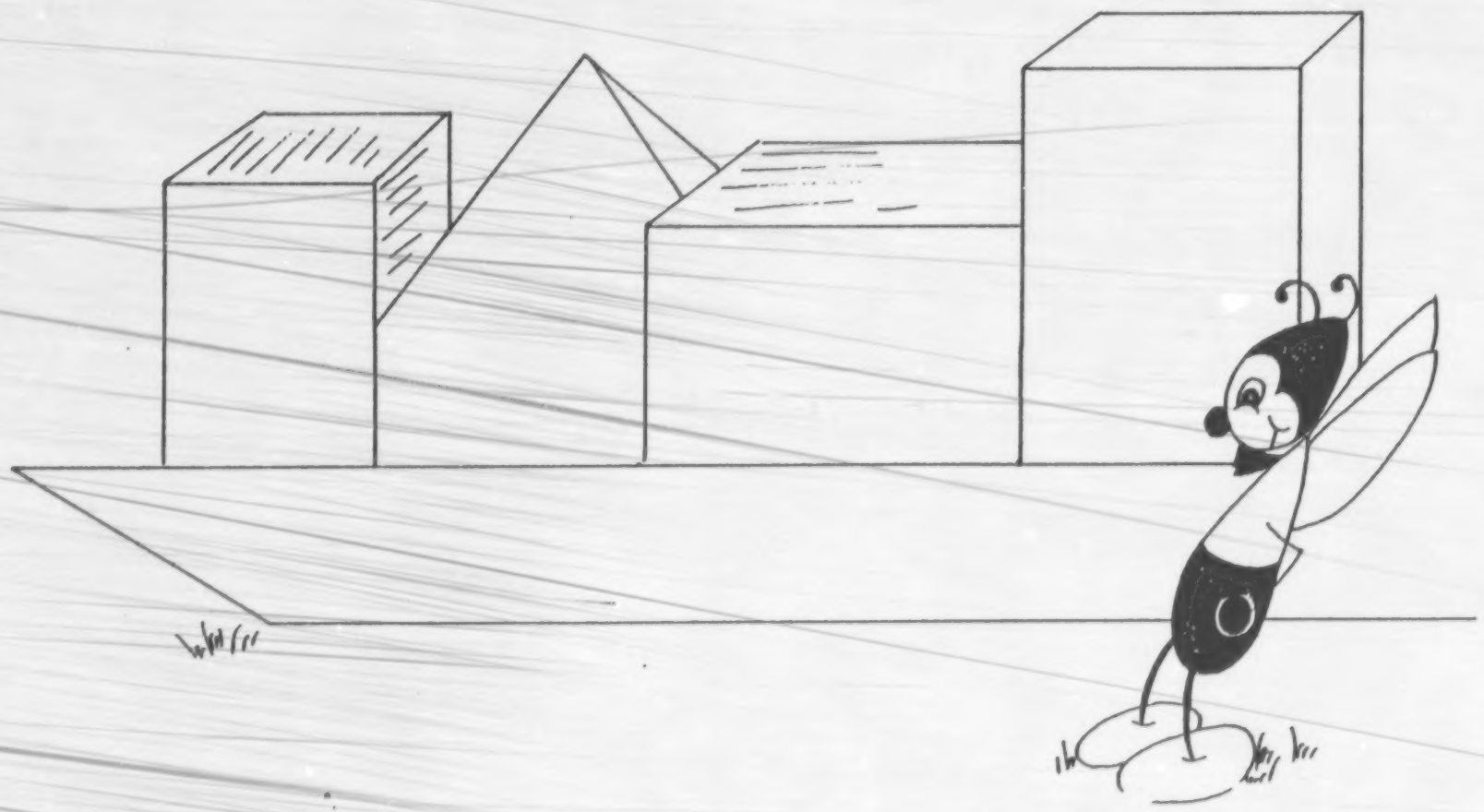
Note: Group children by neighborhood. Have them tour separately and compare observations.

Introduce activity by reading the book, What Ever Happened to the Old Baxter Place? (E)

with:







72

Is Your Neighborhood Changing?

73

Materials

Paper
Pencil
Photos

Directions

1. Trace the history of your school:
   a. Find sources of information:
      (1) Talk to people who attended your school in the past: high school students, college students, adults, senior citizens.
      (2) Find early pictures of your school.
      (3) Look at the original blueprints.
   b. Find out:
      (1) When was the school built?
      (2) Why was it built on that site?
      (3) How many teachers were there?
      (4) What kinds of books and other learning materials were used?

2. What changes have occurred since your school was built? Make a chart:

	CHANGES IN OUR SCHOOL			
Year	Building	Ways of Learning, Learning Materials	Teachers	Children

3. How will your school change in the future? After answering the discussion questions, add your predictions to the chart. Use a different colored pen to show that these changes haven't happened yet but might happen in the future.

Discussion

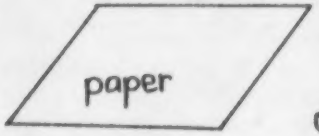
1. What caused each of the changes in your school?
2. Were the changes good or bad?
3. What might cause future changes?
4. How would your school change if:
   the birth rate in your town doubled?
   the birth rate was cut in half?
   the school budget was cut by 25%?
   every classroom had a computer?
5. Which of these changes would be good? Which would be bad?

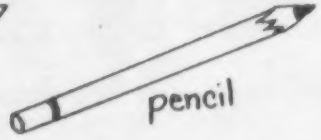
More Ideas

Plan a future school:
Draw a picture.
Draw a floor plan.
Make a model.

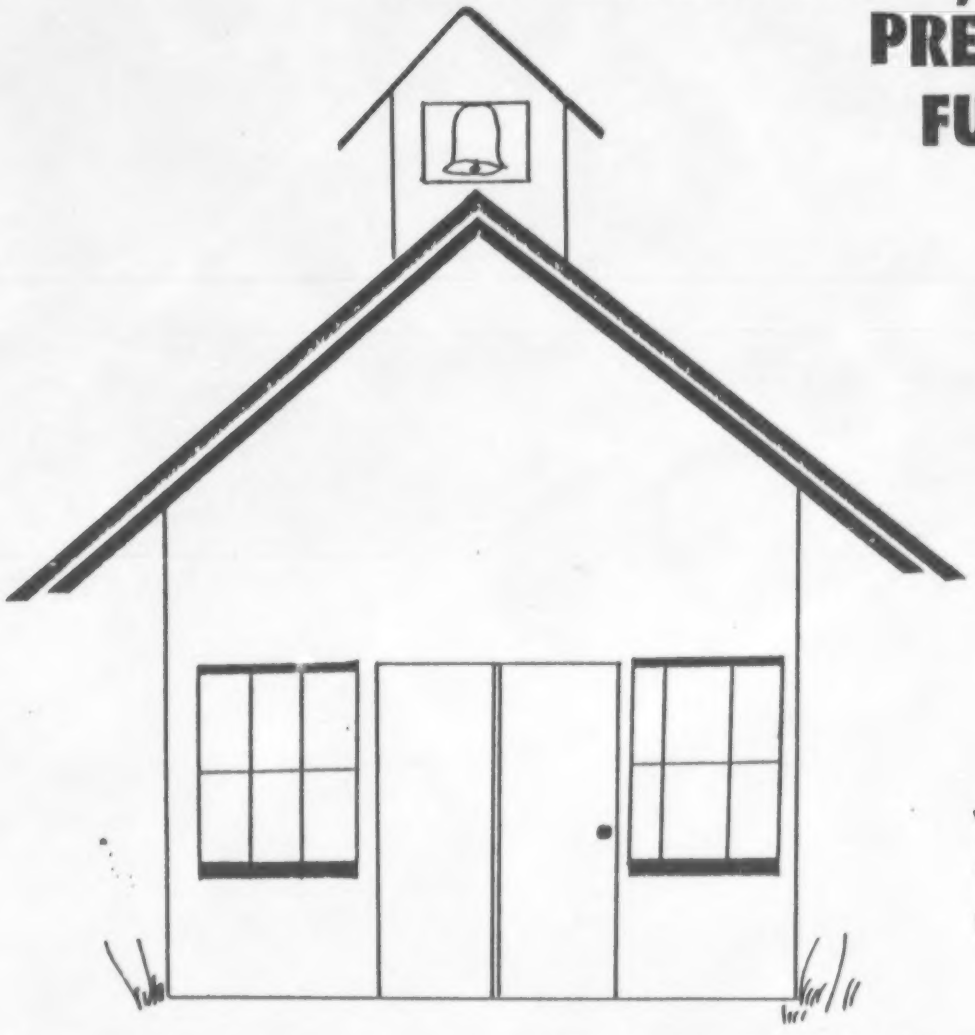
To the Teacher

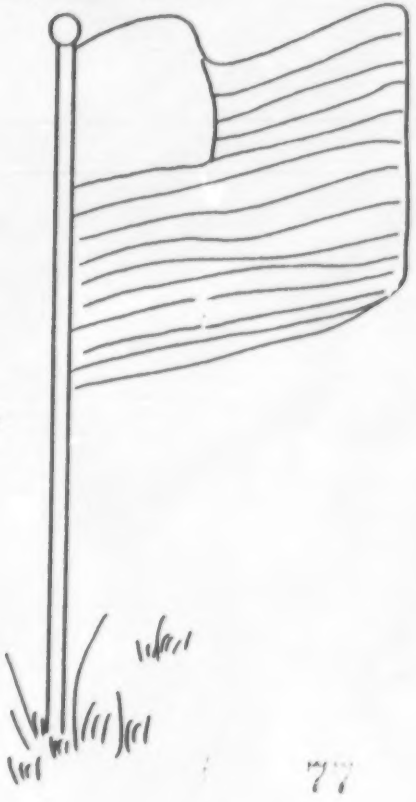
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with: 



OUR SCHOOL ... PAST, PRESENT, FUTURE.





76

77

Materials

Large sheets of paper
Pencils
Markers

Directions

1. Choose a location for your community. You can choose an ideal location or redesign your own community.

2. Which features of this location will affect your planning?
   a. What is the weather like?
   b. Is your community near the ocean, a lake, a river?
   c. Is the countryside flat, hilly or mountainous?

3. List all the needs that people have:
   food
   shelter
   clothing
   schools
   transportation
   etc.

4. Decide how you would provide for each of these needs.

5. Decide where you would locate all the elements of your community: homes, businesses, schools, etc. Draw a map of your community.

Discussion

1. Tell the rest of the class about the community you have planned. Tell why you located homes, schools and businesses where you did.

2. With the help of the rest of the class, evaluate your plan.
   a. Is it practical?
   b. Would it be a good place to live?

More Ideas

1. Visit your library, historical society, or city hall to find out how your own community grew and why things are located where they are.

2. Talk to the people in charge of city planning to see how decisions are made in regard to industrial development, home building, placement of schools, hospitals, etc.

3. Make a model of the city you planned.

4. Describe a day in the life of a family in your ideal community.

To the Teacher

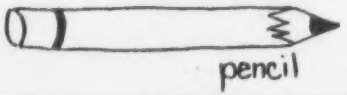
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

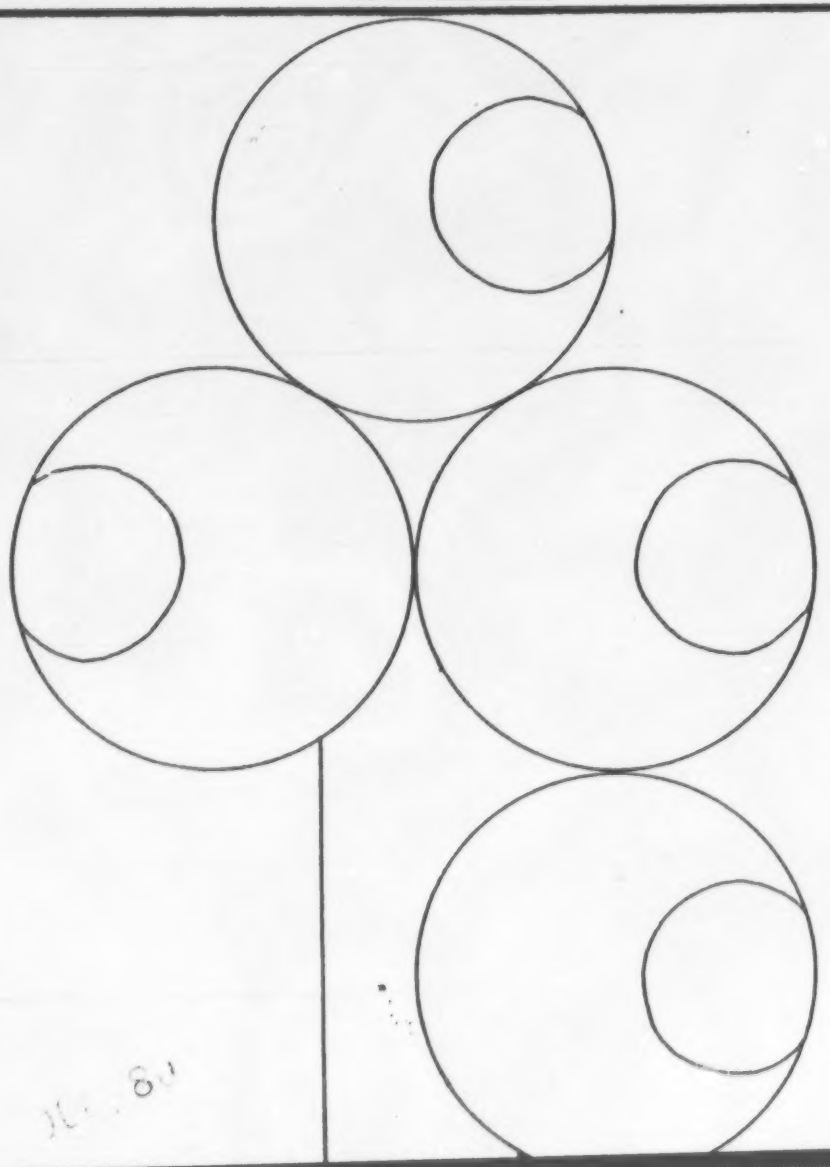
Note: This activity can be done in small groups which later come together to discuss their work.

Recommended reading: The City in the World of the Future,(I
A Place to Live,(E) Colonies in Orbit(I)

Game: New Town

with: paper





Design a Community for 1,000 People.

Materials

Paper
Pencil

Directions

1. Keep track of all the foods purchased for your family for a week. Which are things you need? Which are things you could do without?
   Make a chart:

Necessities	Luxuries

2. Of the foods you need, which are grown or produced in your area? Find out by reading food labels and talking to the manager of your local supermarket.
   a. Underline foods on your list which are produced locally.
   b. Note where the other foods come from.

3. Find out how the foods from outside your area are brought to your store.

4. What would you eat if transportation strikes kept all but the local foods from your supermarket for several weeks? Make breakfast, lunch and dinner menus for one day, using only the foods grown in your area.

Discussion

1. Could you live on just the foods grown in your area?
2. Would you be well-nourished, eating just these foods?
3. Would you be happy, eating just these foods?

More Ideas

1. Choose a product in the grocery store. List all the non-farming jobs which must be done in order for this product to appear on your grocer's shelf.
2. How is population growth related to food production and land use? Do a cross-impact matrix:

	More people	Food Supply	Environment
More people			
Food supply			
Environment			

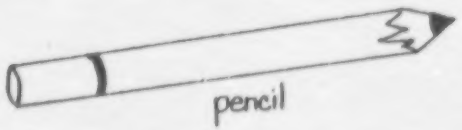
3. In the future, there may be a shortage of food because there will be so many more people on earth. Think of as many different ways as you can to increase the world food supply.

To the Teacher

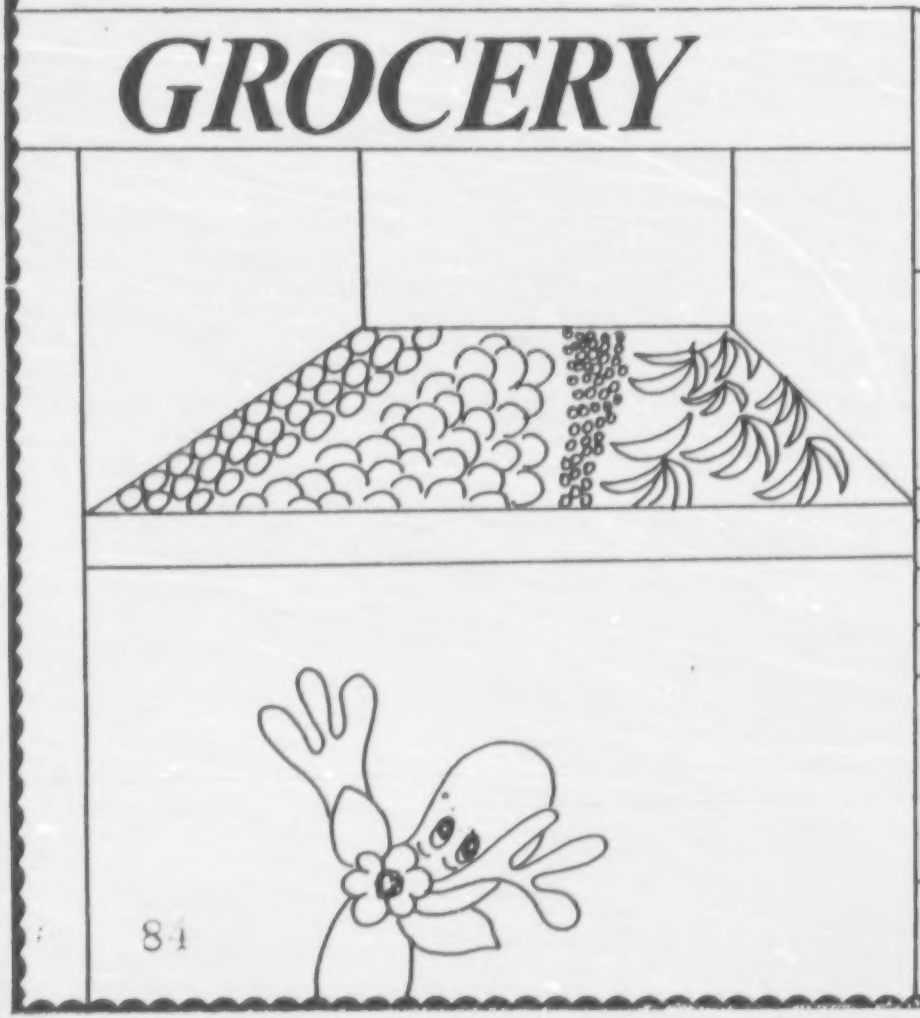
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

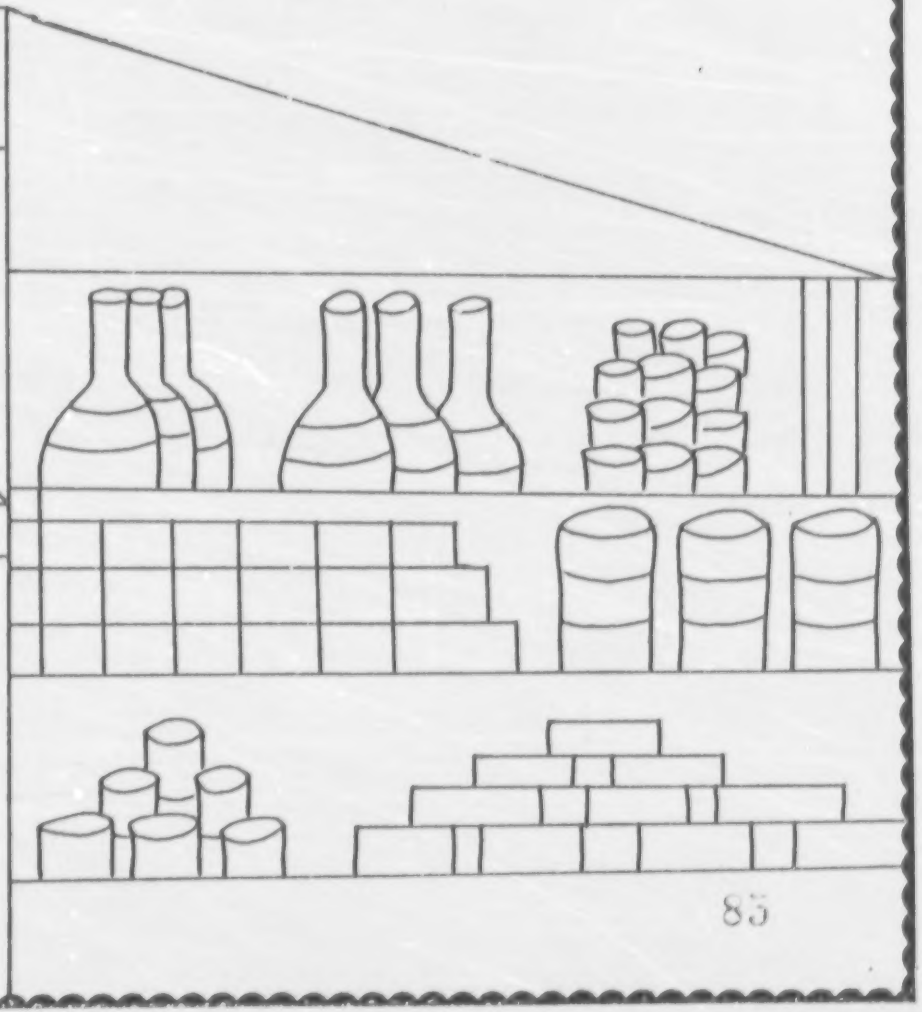
Recommended reading: Our Hungry Earth -- The World Food Crisis (I)

with:



Which Foods Do You Need?





© Copyright 1978 by Minneapolis Public Schools

Materials

Paper
Pencil
(Tape recorder)

Directions

Write, perform or tape record your story.

Discussion

Share your story with friend, a small group or the whole class.

More Ideas

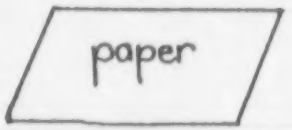
1. Illustrate your story with pictures, maps, charts, or a floor plan.

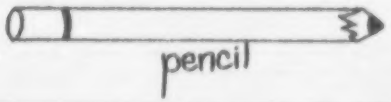
2. Using one of the topics on the front of the card (or a topic of your choice), do a round-robin story: each person writes a paragraph and then passes the story along to someone else, who continues it.

To the Teacher

Skills: Memory, Translate-Interpret, Create

with:





Create-a-Story

1. A Day in Dome City, U.S.A.
2. The House that Recycling Built.
3. Lunar 85 – the First Planned Community on the Moon.
4. Where Would Abe Lincoln Live Today?
5. A Trip on the Super Canal from New York to San Francisco.
6. Shall I Build My House of.....(The Little Pigs of the Future.)
7. How I Felt on My First Day of School in a Space Ship.
8. Life in a Space Station.
9. Life under the Sea.
10. Design and describe an amusement park to be built in 1991.
11. Write a news program that will describe a day in 1994.
12. Create a travel folder for 1988.

83

© Copyright 1978 by Minneapolis Public Schools

Materials

Rope

Directions

1. With the rope, make a circle on the floor.
2. Let each person spend 15 seconds in the circle alone.
3. Then choose one person to stay in the circle.
4. Add two more people and keep doing this until the circle won't hold any more.

Discussion

1. What happened as more and more people got into the circle?
2. Describe your feelings as the circle got more crowded.
3. Will the earth ever get as crowded as you were inside the circle? Tell why or why not.
4. How can we make sure the earth never gets this crowded?
5. Decide which are the 3 best ideas. Do a futures wheel to trace the consequences. Evaluate the results by labeling each with a plus or a minus. Do you still think these are good ideas?

More Ideas

Write a letter to:
- the editor of your school newspaper
- the editor of your local newspaper
- your senator
- your congress-person
- your mayor

Explain your concern about crowding and your ideas for solving the problem.

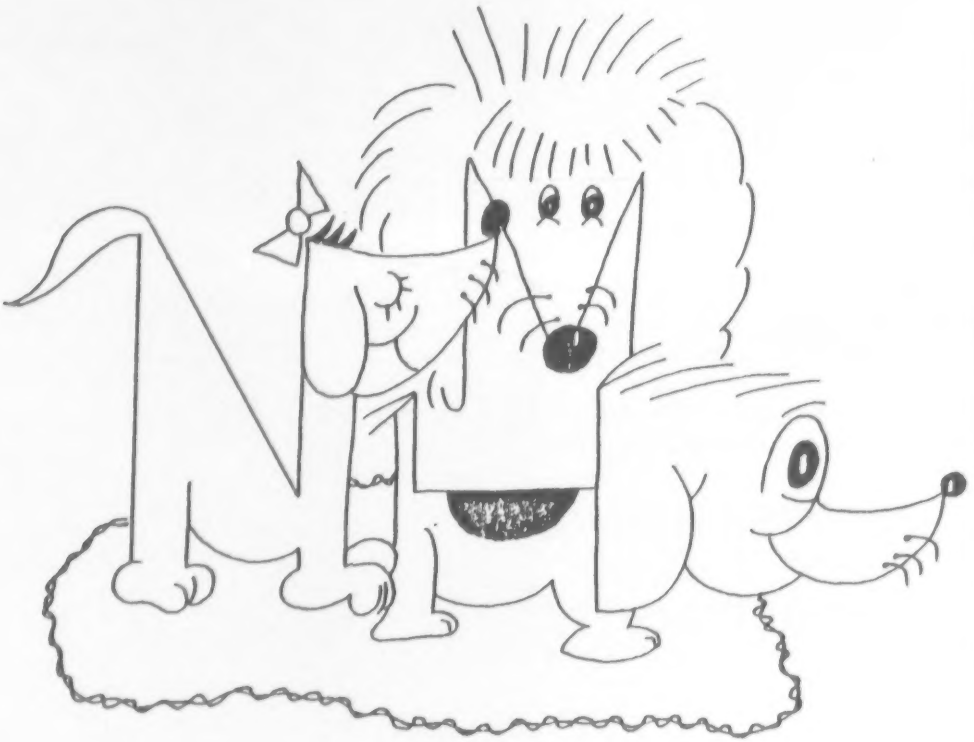
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: Earth's population is currently doubling every 35 years. The U.S. population is doubling every 70 years.

Recommended reading: <u>One Earth</u>, <u>Many People</u> (I)

with:



SPACE SQUEEZE

© Copyright 1978 by Minneapolis Public Schools

Materials

2 pots
Potting soil
Bean seeds
(drainage pan)

Directions

1. Fill pots with potting soil.

2. Plant a small number of seeds (3-5) in one pot and a large number (30 or more) in the other pot.

3. Place both pots in a sunny location and keep moist. You might want to cover the pots with plastic wrap for the first few days.

Discussion

1. What happens to the growth of plants that are uncrowded? slightly crowded? very crowded?

2. Do you think human populations would be affected in the same way?

3. Imagine what would happen if 50 mice were placed in a shoebox. Could they live under such crowded conditions? How would people feel and act under equally crowded conditions?

4. The population of the earth as a whole is currently doubling every 35 years. How old will you be in 35 years? What are some of the things that might happen when the earth is twice as crowded as it is today?

5. Tell what it would be like if these places were twice as crowded:
   your room at school
   your lunchroom
   the playground at recess
   your house
   your neighborhood
   the United States

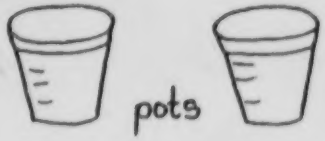
More Ideas

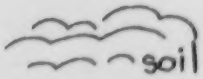
Try the same experiment with different kinds of seeds: lettuce, carrots, corn, etc.

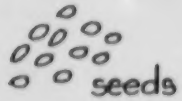
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate.

Recommended reading: One Earth, Many People (I)

with: 





CROWDING

95

Predict what will happen.

96

BEST COPY AVAILABLE

Materials

Large jar
Funnel made from a plastic sheet
Dish of mashed bananas

Directions

Record the number of fruit flies in the jar after 10, 20, and 30 days.

Discussion

1. Can any number of fruit flies live in a jar?
2. How many is too many?
3. At what point are there too many?
4. Why are there too many?
5. What would happen if more bananas were added to the jar?
6. Make a list of signs of crowding.
7. What happens when a living thing runs out of something? What is that important something? Is it food? Space? Peace and quiet? Is it the same for everyone?
8. List some of the ways crowding can be prevented.

More Ideas

Divide the Cake Game

1. Display a piece of cake to the entire class.
2. Invite two students to divide the cake. Before they eat any, stop them.
3. Invite two more students to join them and have them divide each piece in half.
4. Continue until the whole class is involved and there are enough pieces for everyone.

Discussion:

1. Ask each student to tell how he/she felt about sharing the cake.
2. List similarities between this exercise and the world population problem.

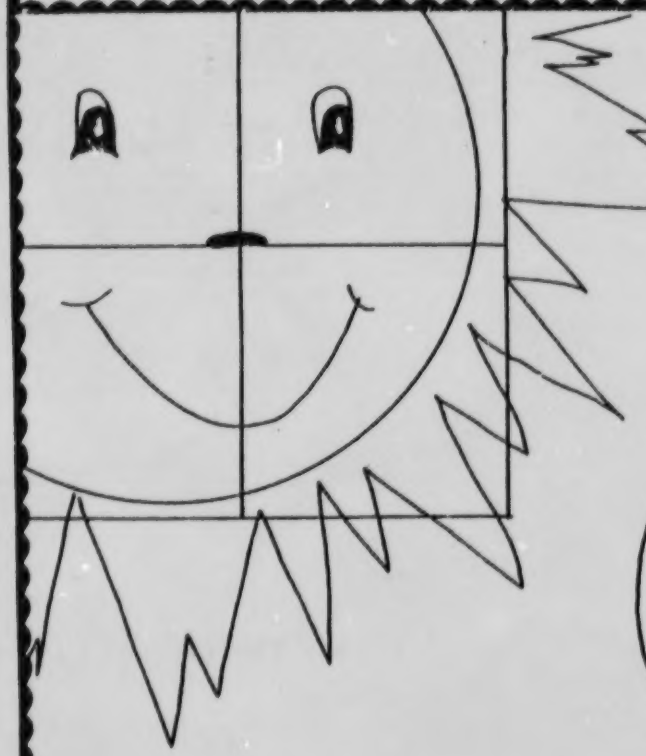
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

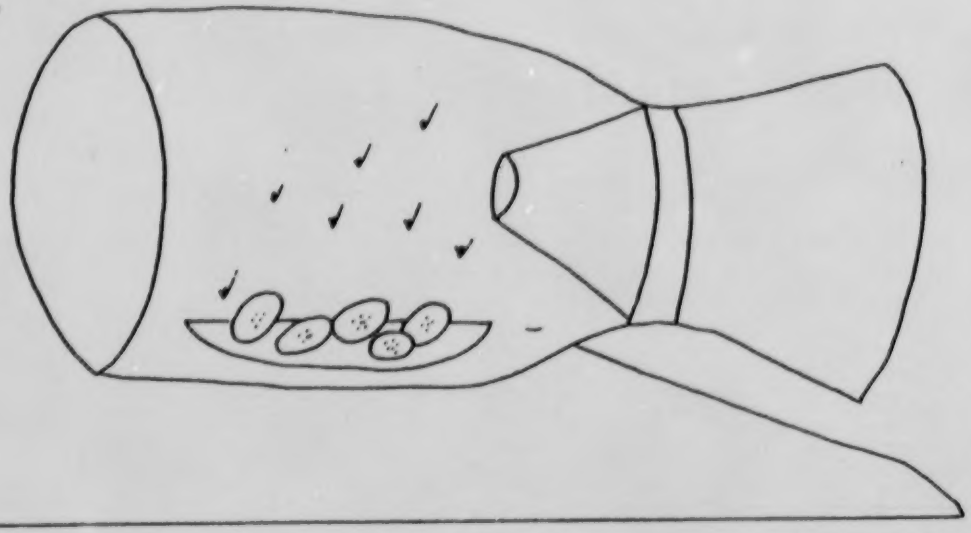
Recommended reading: Our Hungry Earth -- The World Food Crisis (I)

Film: "Food" from series Dimensions of Change

with: bananas



HOW MANY IS TOO MANY?



How many flies after 10 days? 20? 30?

© Copyright 1978 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Paper
Pencil
Measuring device

Directions

1. Find the area of each room in your house:

   area = width x length

2. Find the area of your house by adding the areas of each of the rooms.

3. Find the population density of your house:

   area of house ÷ number of people

Discussion

1. What is the population density of the TV room while your whole family is watching a show?

2. Which room in your home usually has the lowest population density? Which room has the highest?

3. Which is the best room for a party?

4. Which room is best for reading a book?

5. What would happen if your whole family had to live in one room the size of your living room?

More Ideas

1. What is the population of your town? How many square miles does your town occupy? Call your library or city hall to find out. Then figure the population density of your town.

2. Which has more people per square foot, your home or your town?

3. What is the population density of the U.S. as a whole? Look in an atlas, almanac or encyclopedia. Is the U.S. population density higher or lower than that of your town?

4. Which country has the highest population density in the world? Which country has the lowest? Look in an almanac to find out. How does our country compare to these?

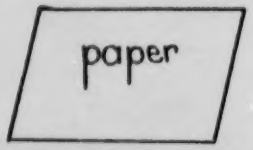
To the Teacher

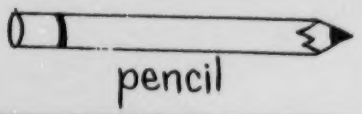
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

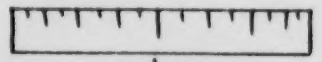
Recommended reading: One Earth, Many People (I)

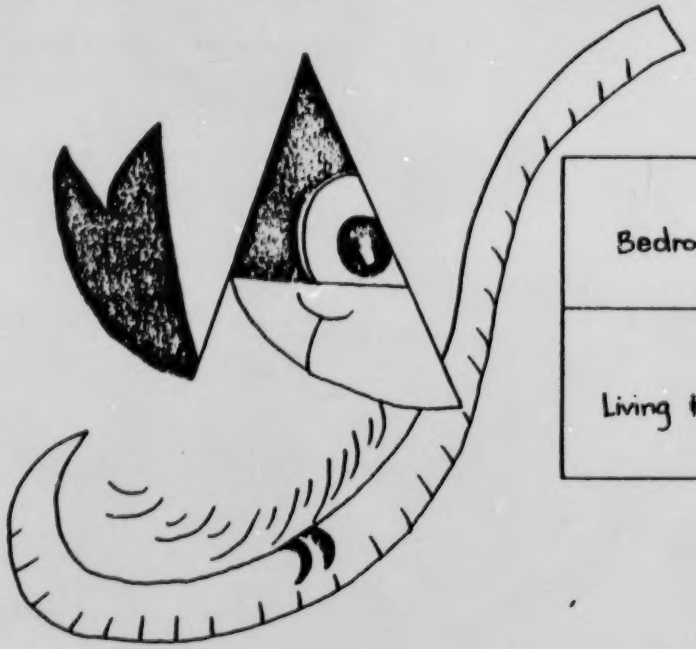
Game: Earth Game

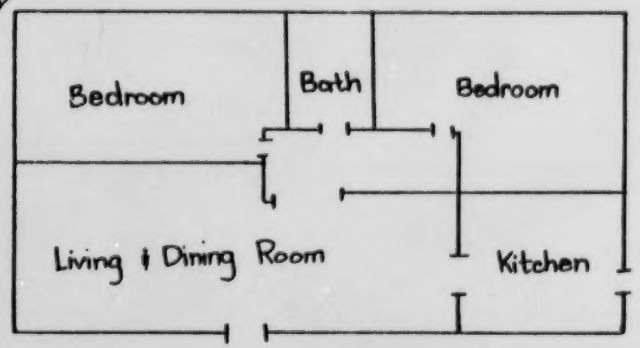
with:







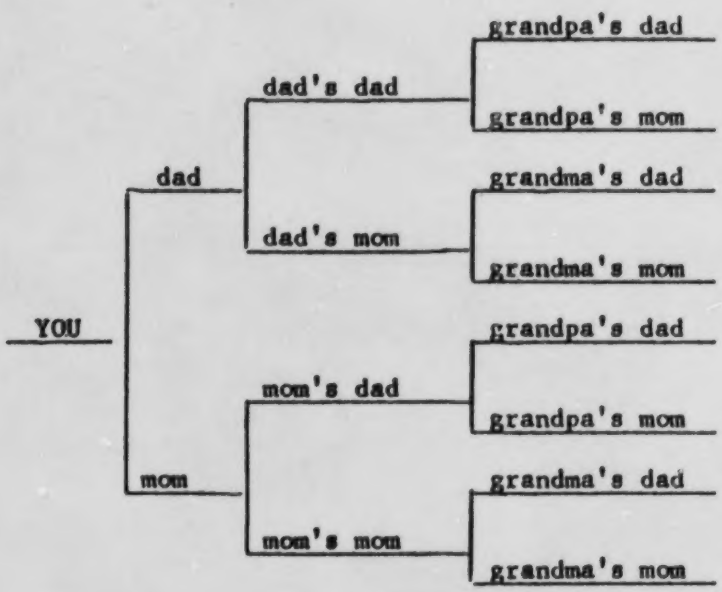




Total area of your house. ÷ The number of people in your family. = **POPULATION DENSITY**

Directions

Make a family tree like the one on the front of this card or like this:



Make a chart:

HOW MANY CHILDREN?			
generation 1. (you)	2 children	4 children	12 children
2. (your children)			
3. (your grand-children)			
4. (your great-grandchildren)			

2. What would happen to the overall population growth if everyone had:
   - 0 children
   - 1 child
   - 2 children
   - 4 children
   - 12 children

3. How many people is too many? Who should decide?

Discussion

1. How many children would be born in your family if you got married and had two children and each of them had two children and each of them had two children? What if each had 4 children? Twelve children?

More Ideas

1. Look in an almanac to find population growth figures for your community, state, U.S., world.

2. What predictions have scientists made about future growth? What might change these predictions?

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Recommended reading: One Earth, Many People (1)

with: paper pencil

Draw.

MY GREAT GRANDPARENTS MY GREAT GRANDPARENTS

MY GRANDPARENTS MY GRANDPARENTS

MOM DAD

ME

MY FAMILY TREE

Materials

Paper
Pencil
Graph paper
Ruler
(Class lists)

Directions

1. What percentage of the school population is male? What percentage is female? Make an estimate. Give reasons for your estimate.

2. Survey each room in your school or check class lists. Graph the results.

3. Was the actual percentage the same as your estimate? If not, list some possible reasons for the difference.

Discussion

1. In the future, people might be able to choose the sex of their children. Do you think this would be good or bad?

2. If you had children, would you want boys or girls? Do you think others would feel the same way? What if everyone did?

3. What would happen if:
   people had only girl children?
   people had only boys?
   3/4 of the children were boys?
   3/4 of the children were girls?
   half were boys and half were girls?

4. Do you think people should be allowed to choose the sex of their children? How should the matter be decided?

More Ideas

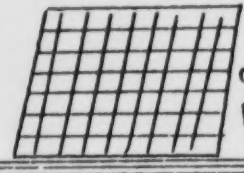
1. Call your city hall. Check the census records to find out the percentage of males and females in your community.

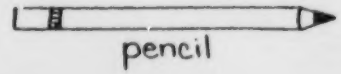
2. Predict what percentage of next year's kindergarten class might be male or female.

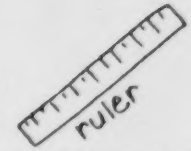
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with:







What percentage of the school population is male/ female? Guess first.

Record and compare.

Name

Room Number	Boys	Girls
102	16	12
103	10	1
104	19	
105	13	

HOW MANY GIRLS... HOW MANY BOYS?

Materials

Clear, see-through plastic box
Enough soil to fill box half full
Different types of solid waste, such as:
- apple core
- aluminum foil
- cardboard
- glass
- plastic
- paper
- metal
- bread

Directions

1. Put a layer of soil in the box.
2. Add waste. Put the waste samples near the outside of the box so they can be seen.
3. Cover the waste with the rest of the soil.
4. Water lightly from time to time.
5. Observe for 3-6 months.

Discussion

1. What types of waste rot? What types do not?
2. Do wastes rot faster or slower in a landfill-type dump? Why do most towns use a landfill?
3. What can be done with materials that don't rot?
4. What should be done with dangerous wastes like radioactive materials?
5. Who is responsible for waste removal in your town?
6. What will happen if we run out of space for dumps?

More Ideas

Visit your local dump.

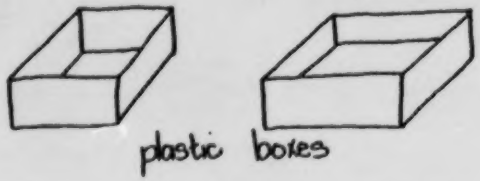
To the Teacher

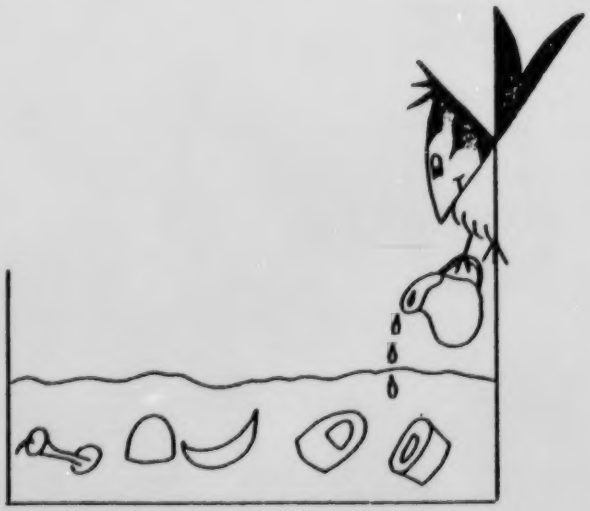
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate.

Note: This composting technique eliminates odor problems. Set this experiment up at the beginning of a pollution unit and observe throughout time period. Waste will decompose faster if box is placed in the sun.

Recommended reading: What Happens to the Garbage?(E) How Do They Get Rid of It? (I)

with:





Make Your Own Dump.

116

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Paper
Pencil
(Tape recorder)

Directions

1. List sounds that have a pleasant meaning for you.

   List sounds that have an unpleasant meaning for you or sounds that bother or scare you.

   List useful sounds.

2. List all the sounds we hear today that people didn't hear 100 years ago.
   How many of these are pleasant to you?
   How many are unpleasant to you?

3. List some of the new sounds we might hear in the future. Which ones will be pleasant? Which might be unpleasant?

Discussion

1. Compare your list of sounds with those of others in the class. Does everyone agree?

2. Is the world becoming noisier or quieter? What will happen if this trend continues? Do a future wheel to find out.

3. List all the different ways noise could be controlled.

More Ideas

1. Tape record familiar sounds and have other people guess what they are.

2. Listen to recordings of An American in Paris by George Gershwin or Music for a Great City by Aaron Copland. List all the "city" sounds you hear in the music.

3. Use the school's hearing tester to see which sounds students can hear best.

4. Call the health department to find out how industrial noise is measured and controlled.

5. Consult zoning and building codes regarding noise control.

6. Consult your local airport commission and highway department to find out how noise is kept at an acceptable level.

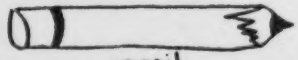
To the Teacher

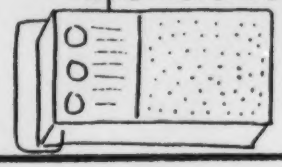
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

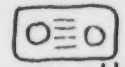
Recommended reading: Our Noisy World (I-H)

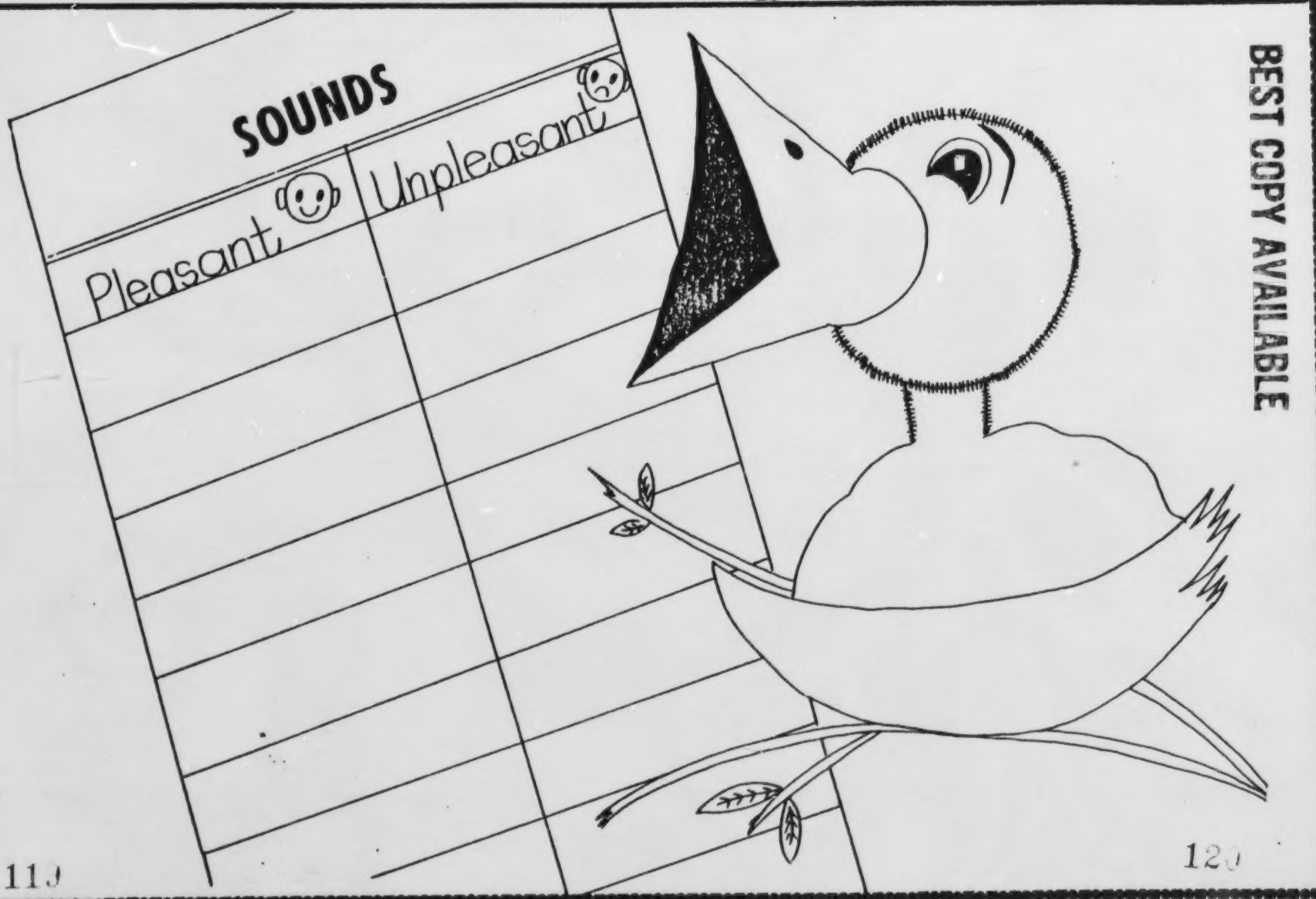
with:

paper


pencil


tape recorder


cassette tape



BEST COPY AVAILABLE

© Copyright 1978 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Samples of various kinds of packaging
or
Newspapers and magazines

Directions

1. Collect samples of as many different kinds of packaging as you can -- or find pictures of different kinds of packages in magazines and newspapers.

2. Why are products sold in packages?
List as many different reasons as you can.

Discussion

1. What natural resources were used to make the packages you collected?

2. Of the samples you collected, how many are:
reusable?
biodegradable?

3. Do things cost more when they're packaged?

4. Which kinds of packaging are good? Which are unnecessary? Tell why you think so.

5. How many of the items you collected would have been sold in packages 50 years ago? How would they have been sold then?

6. What might happen if the trend toward more packaging continues? Do a futures wheel to find out.

7. What factors might change the trend toward more packaging?

8. What could you do to influence this trend?

9. Predict what packaging might be like in the future.

10. What might the things we're throwing away today tell archeologists of the future about our way of life?

More Ideas

1. Study Nature's packaging.

2. Take a litter walk.

3. Organize a litter brigade.

4. Set up a recycling center.

5. Make a list of products that could be sold in reusable containers.

6. Write to elected representatives and tell them what you think about the use of returnables.

To the Teacher

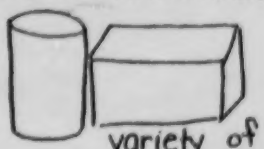
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: In 1976, people in the U.S. threw out 147 billio pounds of packaging -- 1½ times as much as 10 years ago. Over 43% of all packaging is for convenience foods.

with:

magazines

newspaper



variety of packages

123

Why Do We Have Packaging?

124

Materials

2 glasses
Snow
Filter paper
Funnel
Magnifying glass

Directions

1. Find some clean snow that hasn't been walked on or packed down.
2. Collect some of the snow in a glass.
3. Allow the snow to melt.
4. Filter the water through the funnel.
5. Examine the filter paper with a magnifying glass.

Discussion

1. What do you see on the filter paper?
2. Where did it come from?
3. How clean is snow?
4. How could we make it cleaner?

More Ideas

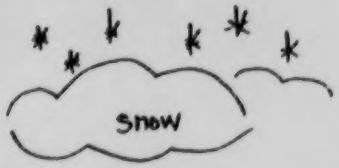
Find out what your community does to monitor and regulate air pollution.

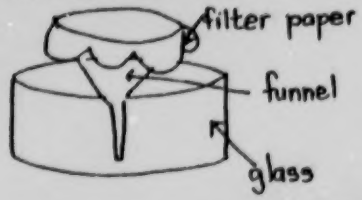
To the Teacher

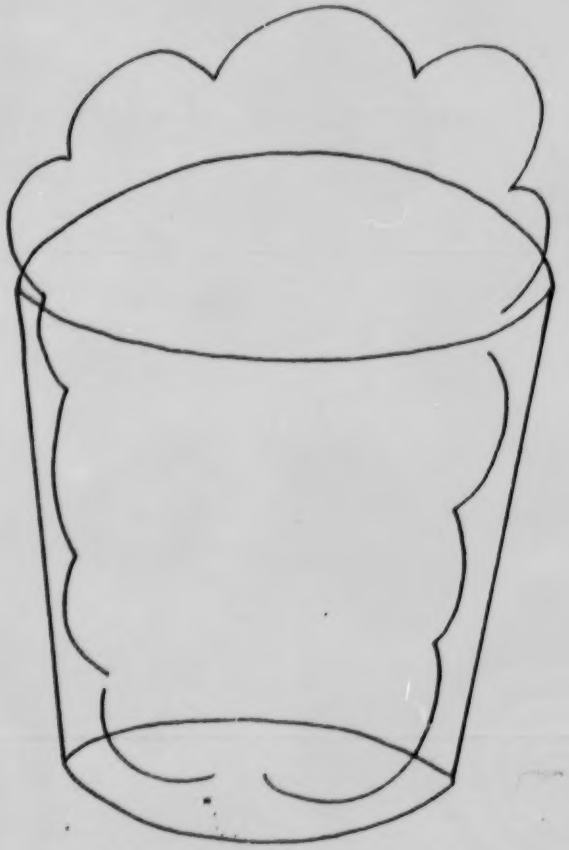
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate.

Recommended reading: The Air We Breathe (E), Our Dirty Air (I)

with:







127

WHAT IS AIR POLLUTION?

123

Materials

2 boards
thumb tacks
white felt or cotton batting

Directions

1. Secure a large strip of white felt or cotton batting to a board.
2. Cover 4/5 of the felt or cotton with another board.
3. Hang the board outside.
4. Leave the board outside for five days. Uncover another 1/5 of the cotton each day.
5. Tell what happens. Why do you think this is happening?
6. Examine each section of felt or cotton under a magnifying glass. Draw a picture of what you see.

Discussion

1. Is your air as clean as you would like it to be?
2. Brainstorm all the ways to eliminate air pollution. Then evaluate your ideas -- are they costly, practical, etc?
3. What steps can you take to help eliminate air pollution? Develop a plan of action.

More Ideas

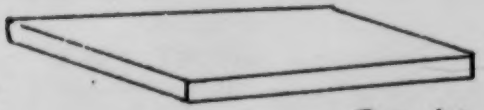
1. Identify polluters in your community. Write letters to them, asking how they plan to deal with the problem.
2. Write letters to people in government. Tell them your suggestions.
3. Write letters to the editor of your newspaper. Tell him/her about your air pollution project and your findings.

To the Teacher

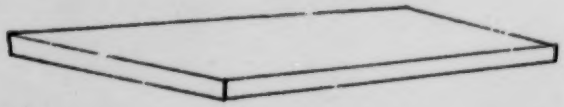
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Recommended reading: The Air We Breathe (E), Our Dirty Air (I)

with:

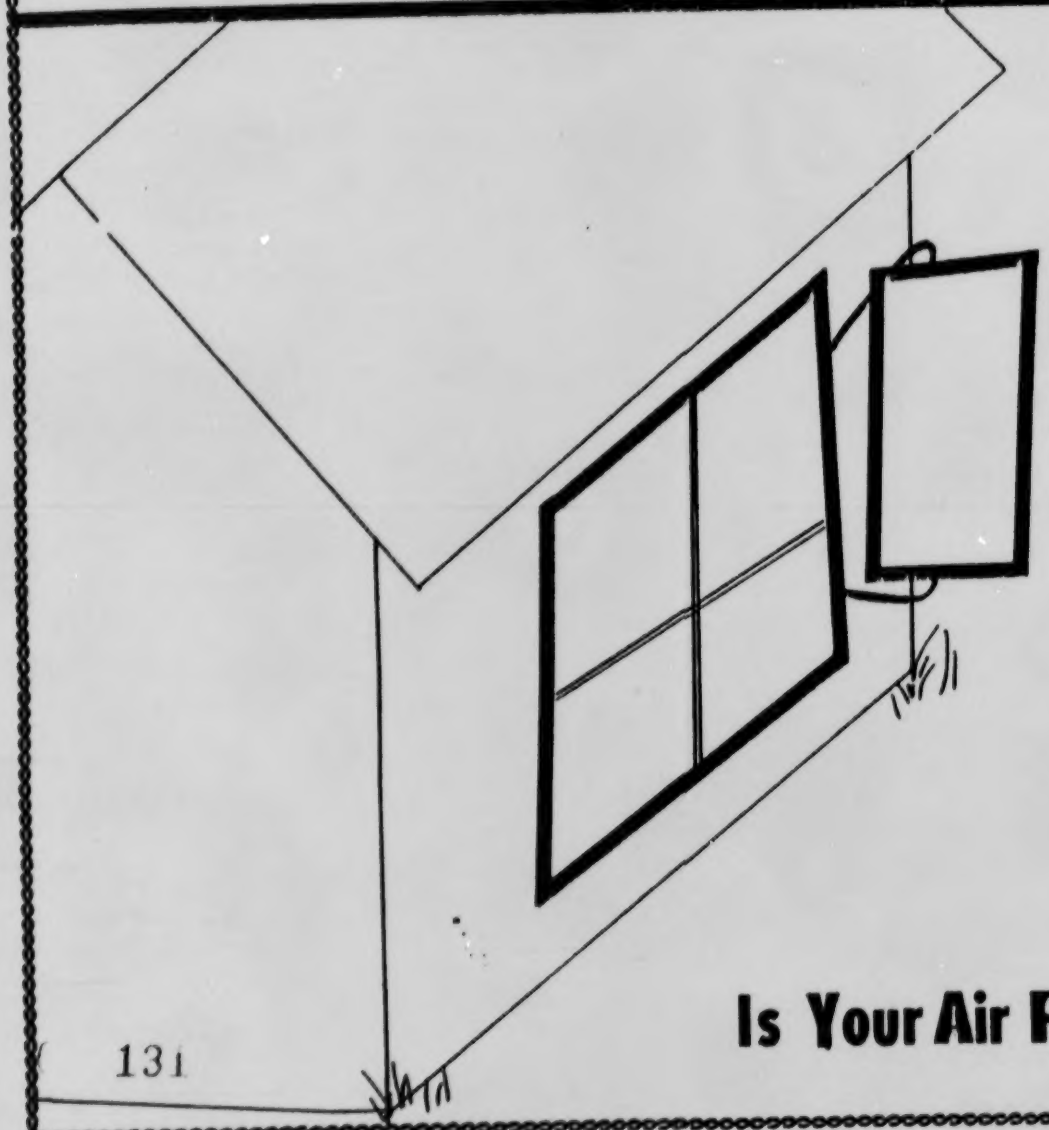


Two (2) boards



White felt

BEST COPY AVAILABLE



Is Your Air Polluted?

© Copyright 1979 by Minnesota Council on Quality Education

Materials

Old magazines and newspapers
Scissors
Glue
Paper

Directions

1. List all the different kinds and sources of pollution.
2. Make a pollution collage from pictures taken from magazines or newspapers -- or from materials collected on a waste walk.

Discussion

1. What kinds of pollution have you observed in your neighborhood or community?
2. What causes this pollution?
3. Brainstorm all the ways to eliminate the pollution in your neighborhood.
4. Evaluate these ideas. Will they have any bad consequences?
5. What might happen if:
   a. air pollution caused a serious lack of oxygen?
   b. a breakdown at a nuclear power plant leaked radioactive material into the air and water supply?
   c. people keep on dumping garbage and chemicals into the ocean?

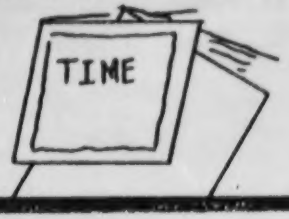
More Ideas

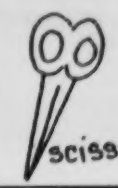
1. Form "Pollution Patrols" to abolish waste and pounce on polluters in the school neighborhood.
2. Have a contest to design a patch for your Pollution Patrol.
3. Find out what your community does to monitor and control pollution.

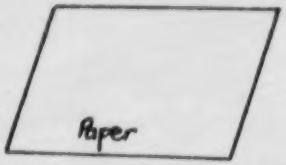
To the Teacher

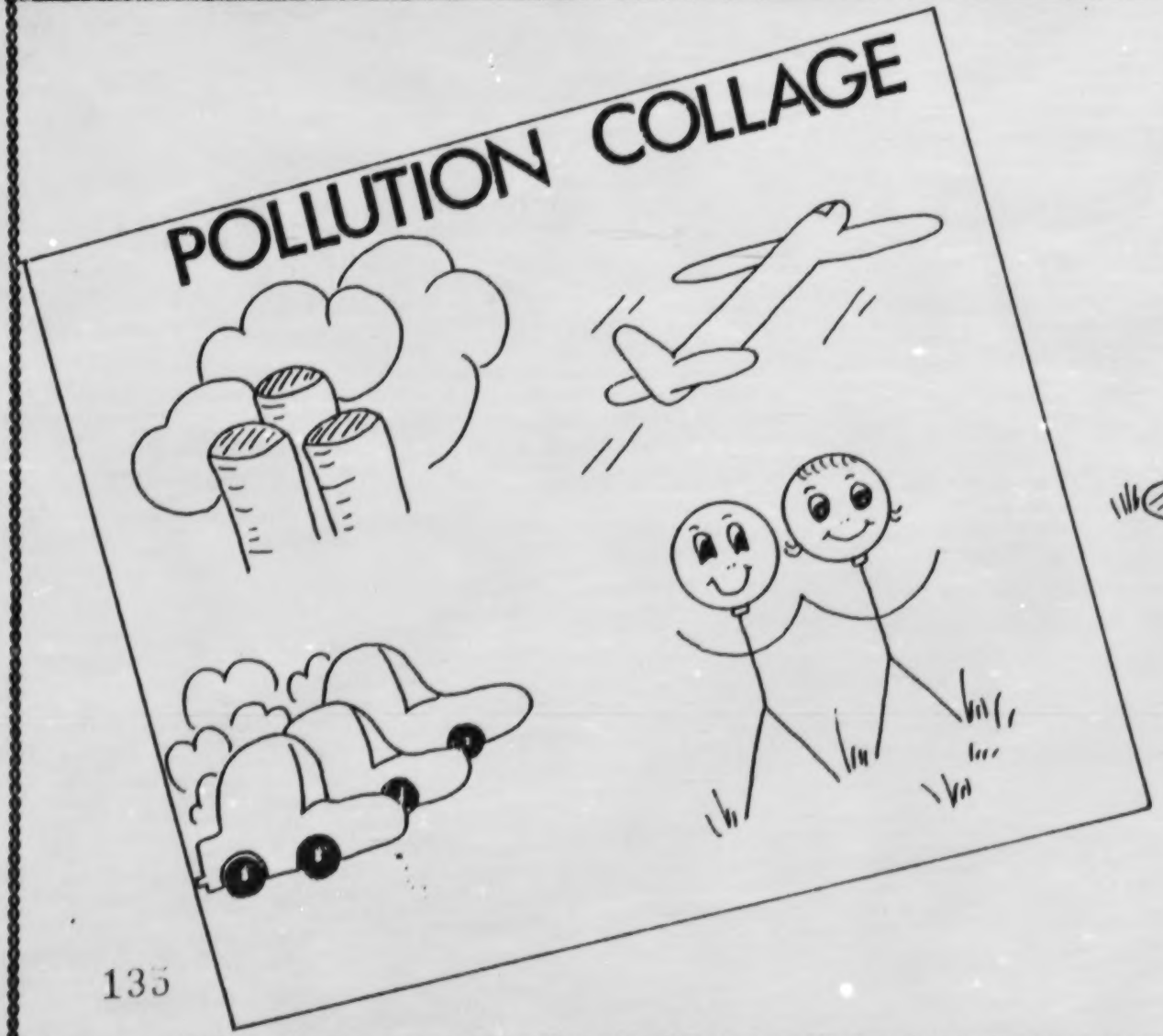
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with:









BEST COPY AVAILABLE

Materials

8-10 pieces of tissue
Piece of screen 3 inches square
Flat pan a little bigger than the screen
3-4 pieces of white blotting paper the size of the screen
Egg beater
Round jar, rolling pin or iron
Newspaper
Instant starch
Bowl

Directions

1. Tear the tissue into very small pieces in the bowl.
2. Add 2 cups of hot water and beat with egg beater to make pulp.
3. Add 2 teaspoons starch to pulp.
4. Pour pulp into flat pan.
5. Slide screen into bottom of pan and move it around until evenly covered with pulp.
6. Lift the screen out carefully. Hold it level and let it drain for a minute.
7. Put screen, pulp side up, on a blotter on some newspapers.
8. Put another blotter over pulp, more newspapers over that, and roll the jar over the whole pile to squeeze out the rest of the water.
9. Take off the top newspapers. Turn blotter sandwich over so screen is on top.
10. Take off blotter and screen very carefully. Don't move the pulp.
11. Put a dry blotter on the pulp and let the pulp dry. There is your paper!

Discussion

Think of as many ways as you can to conserve paper at home and at school. Make a list.

More Ideas

1. Have a paper drive.
2. Visit a paper recycling plant or a paper factory.

To the Teacher

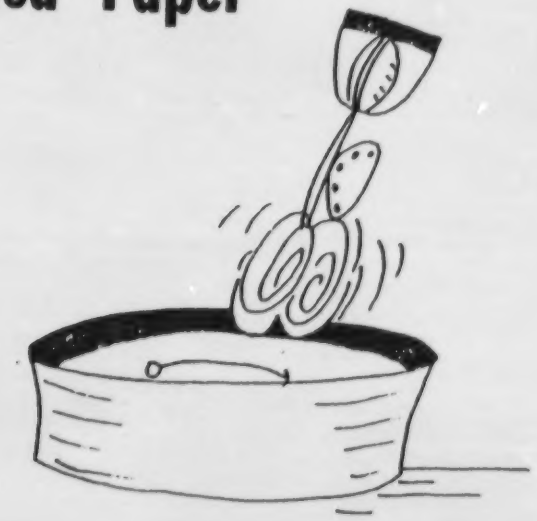
Skills: Memory, Translate-Interpret, Analyze-Apply

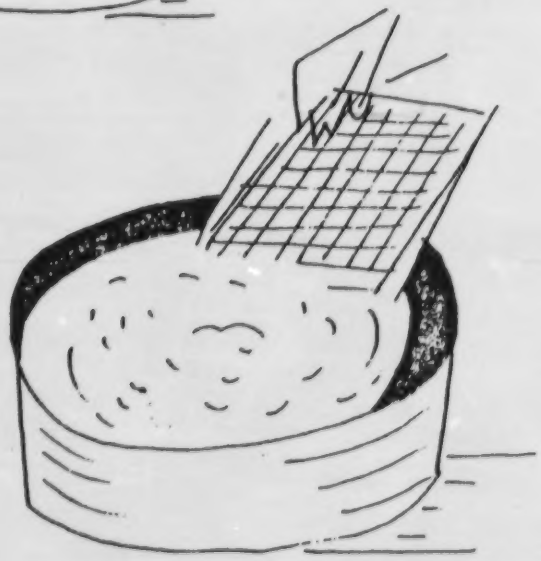
Note: Paper will dry quicker if an iron is used instead of a rolling pin.

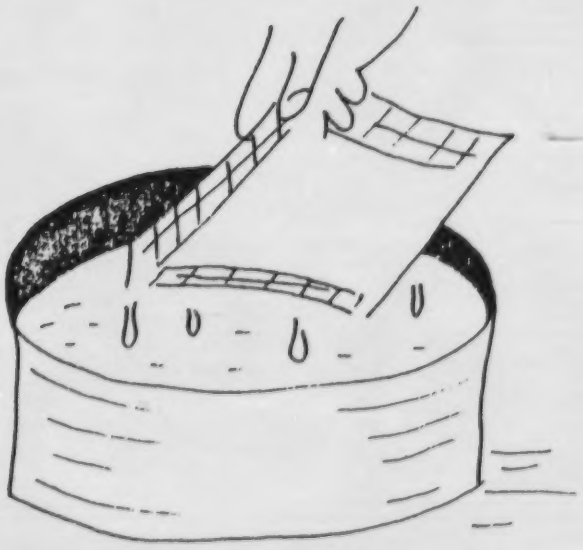
Note: *Just one Sunday newspaper of 128 pages and a readership of 1 million people uses up 140 acres of pulpwood timber. *Only 1/5 of a tree can be used for pulpwood -- the rest is waste. *Every ton of papers collected allows 17 trees to remain alive.

with: tissue screen pan bowl instant starch egg beater rolling pin

Make Your Own Recycled Paper







BEST COPY AVAILABLE

Materials

Paper
Pencil

Directions

1. Answer the discussion questions.

2. Draw a series of pictures showing all the things that might happen to a car during its lifetime from its "birth" in a factory to its "death" in a junk yard or wrecking company.

   or

   Pretend you are a car. Write or tell the story of your life.

Discussion

1. What do you do with a car you don't want? What happens to it?

2. What happens to abandoned cars?

3. List all the different materials used in the manufacturing of cars. Which of these materials can be recycled?

4. Is there a firm in your community that recycles materials from old cars? Look in the Yellow Pages under "Scrap Metals." Call and find out what they buy and how much they pay for the materials.

5. How could we do a better job of recycling materials from old cars?

6. What kinds of materials might cars be made of in the future? Will recycling be more or less important in the future?

More Ideas

1. Take a trip to an automobile wrecking company to see what happens.

2. Collect some old, junked auto scrap. See if you can make something beautiful from it.

3. For further information on recyling, write to:
   Institute of Scrap Iron & Steel, Inc.
   1729 H street NW
   Washington, DC

To the Teacher

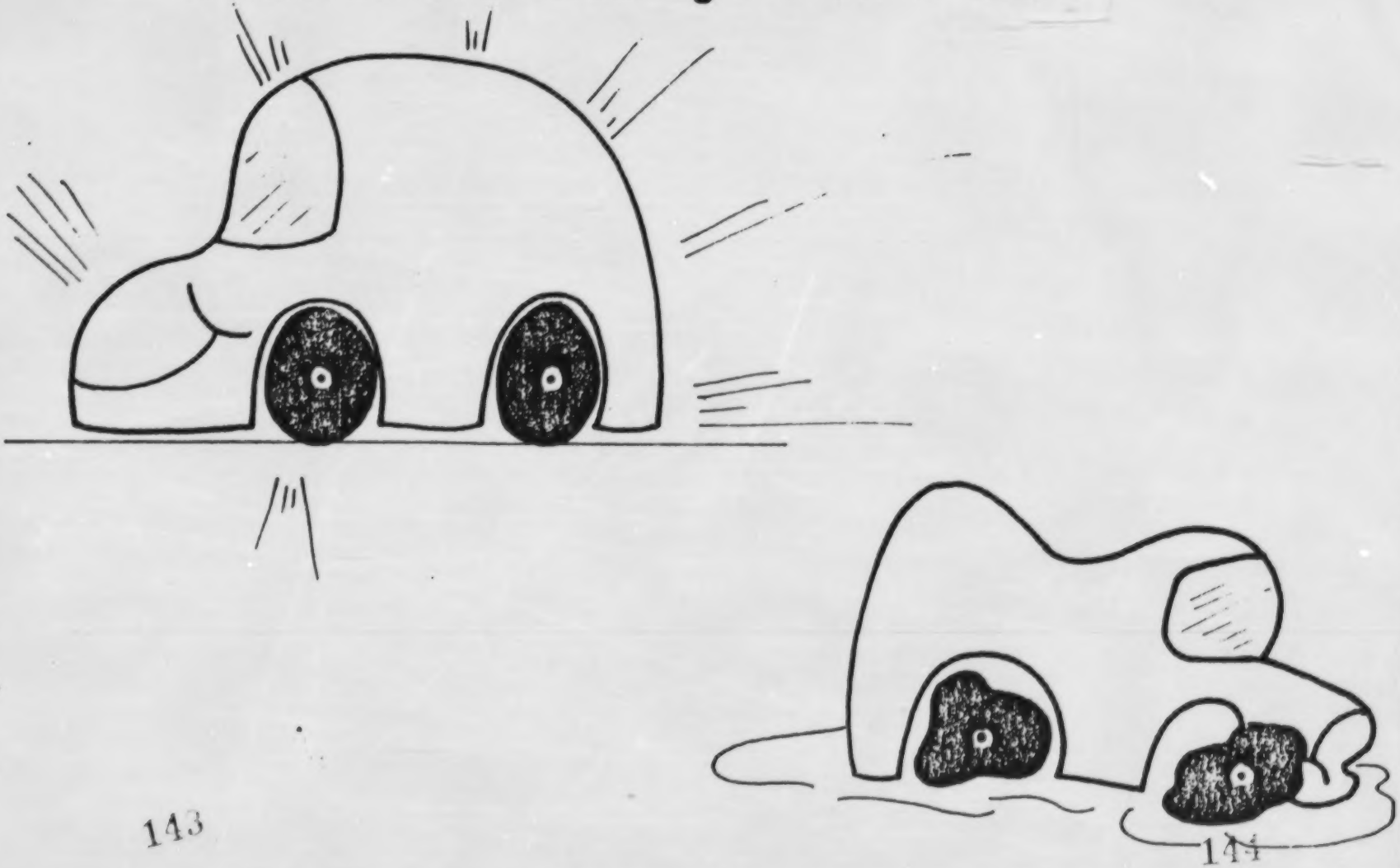
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: Six million autos are discarded every year in New York City alone. Forty thousand people just leave their cars on the streets to get rid of them.

Recommended reading: How Do They Get Rid of It? (I)

with: paper pencil YELLOW PAGES

What Is the Life Cycle of a Car?



143

144

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Paper
Pencil
Reference sources, such as:
World Almanac
Consumer Reports

Directions

Chart the gasoline consumption of popular American and foreign cars. Use the World Almanac or Consumer Reports to find the figures.

Discussion

1. If you were buying a car, which kind would you buy? Tell why.

2. How much does gasoline cost today? How much do you think it will cost 10 years from now? Give reasons for your answer.

3. What will happen if we continue to use gasoline at the present rate? Do a futures wheel to find out.

4. Will we have cars 20 years from now? If so, what kinds might we be driving then?

More Ideas

1. Make a chart comparing different modes of transportation and fuel consumption:

Mode of Transportation	Miles Traveled	Number of Passengers	Gallons of Fuel
Bus			
Airplane			
Car			
Train			
Boat			
Bicycle			
Motorcycle			

Which vehicle uses the most fuel per passenger? Which uses the least?

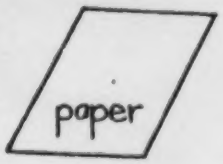
2. Predict the kinds of transportation we will be using 20 years from now for:
a trip to the supermarket
going to school
going camping
a 100-mile trip to another city

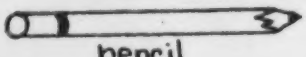
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Recommended reading: Transportation in the World of the Future

with:





HOW MUCH FUEL DOES IT USE?

Car	Engine Size	mpg

147

143

BEST COPY AVAILABLE

Materials

Paper
Pencil
Markers

Directions

1. Survey classmates to see how each one gets to school. Make a bar graph.
   a. Which kind of travel is used by the largest number of students?
   b. Which kind is used by the smallest number?
   c. Which kind uses least energy?
   d. Which kind pollutes least?

2. Keep track of all the times you ride in a vehicle for 2 days. Keep track of the distance.
   a. How much gas was used?
   b. If everyone in your town traveled that same amount, how much gas would be used?
   c. Which of those distances could be walked or biked?

3. Find out how many cars a local garage/parking lot can hold.
   a. How many bikes can fit in the space it takes to park one car?
   b. How many bikes could the garage/parking lot hold?
   c. How much land would be free for other uses if everyone rode bikes to work and to the store?
   d. What could be done with this extra land?

Discussion

1. What are the advantages of using bikes rather than cars? What are the disadvantages?

2. What would happen if there were no cars and everyone rode bikes? Do a futures wheel to find out.

More Ideas

1. Take a survey: how many safe places can you find to ride and park your bike? Design a bike trail near your school.

2. Design a bike rack.

3. Have a bike parade.

4. Construct a bike obstacle course.

5. Start a bike safety program.

6. Write poems and draw cartoons that show why people should ride bikes.

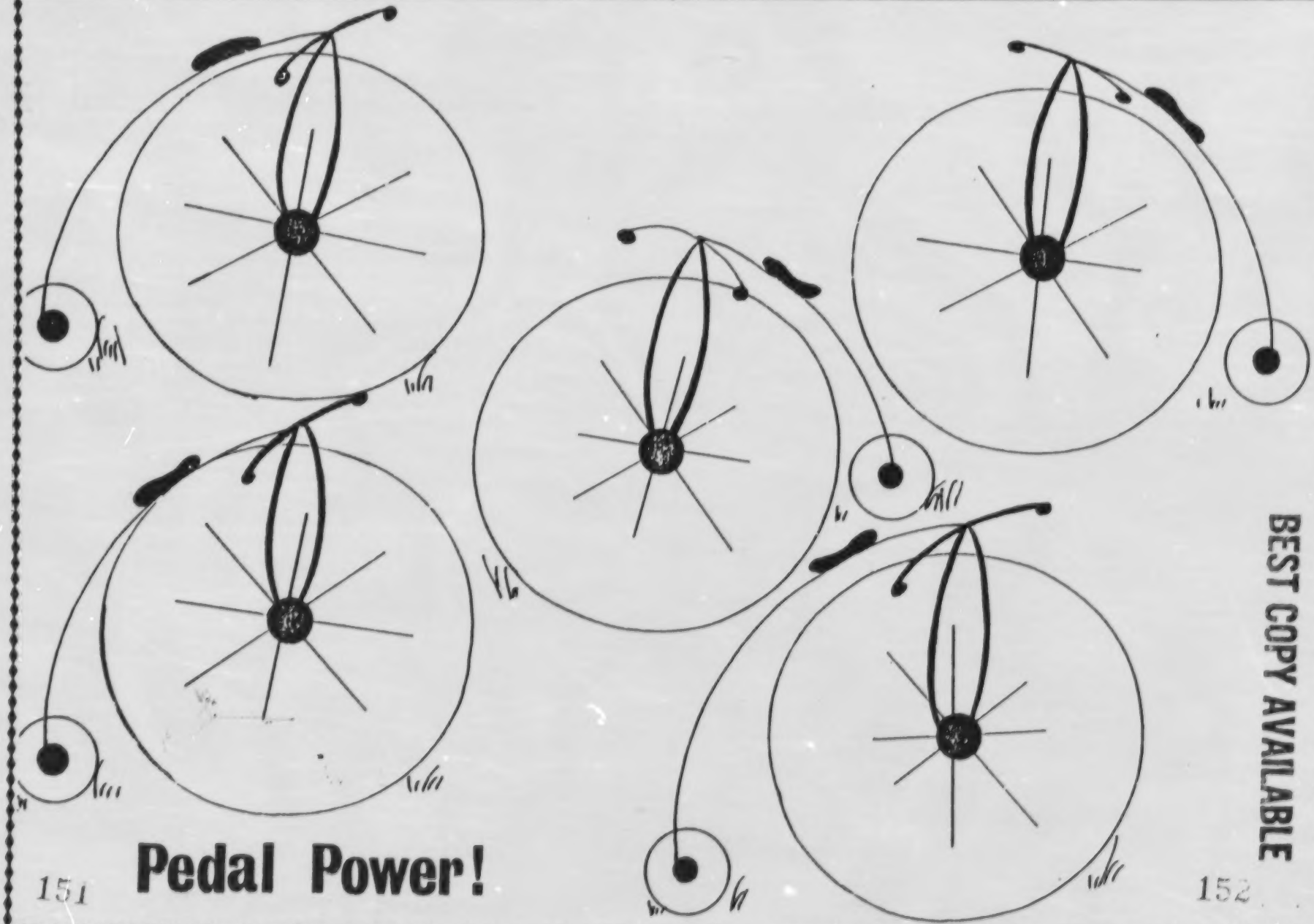
7. Hook a generator to a bike and see how much work you can do.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: This makes a good addition to a bicycle safety unit.

with: paper pencil



Pedal Power!

151

152

BEST COPY AVAILABLE

Materials

Paper
Pencil

Directions

Draw a picture of the device which will take you to work when you are 45 years old.

Note: It doesn't have to be anything like the picture on the front of the card. Try to design something no one else will think of.

Discussion

1. Describe your mode of transportation and tell how it works.
2. What powers your device?
3. What optional and/or safety features does it have?
4. Do other people get to work the same way you do?

More Ideas

1. Display your drawing on a bulletin board.
2. Make a model of your device.
3. Visit a trade show.
4. Visit your local mass transit department.
5. Read about the history of mass transportation and explore the latest developments.

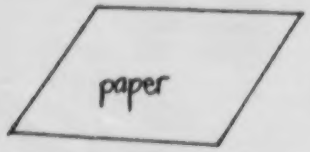
To the Teacher

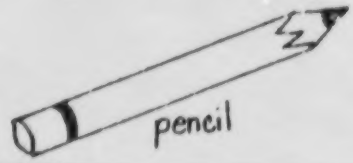
Skills: Memory, Translate-Interpret, Analyze-Apply, Create

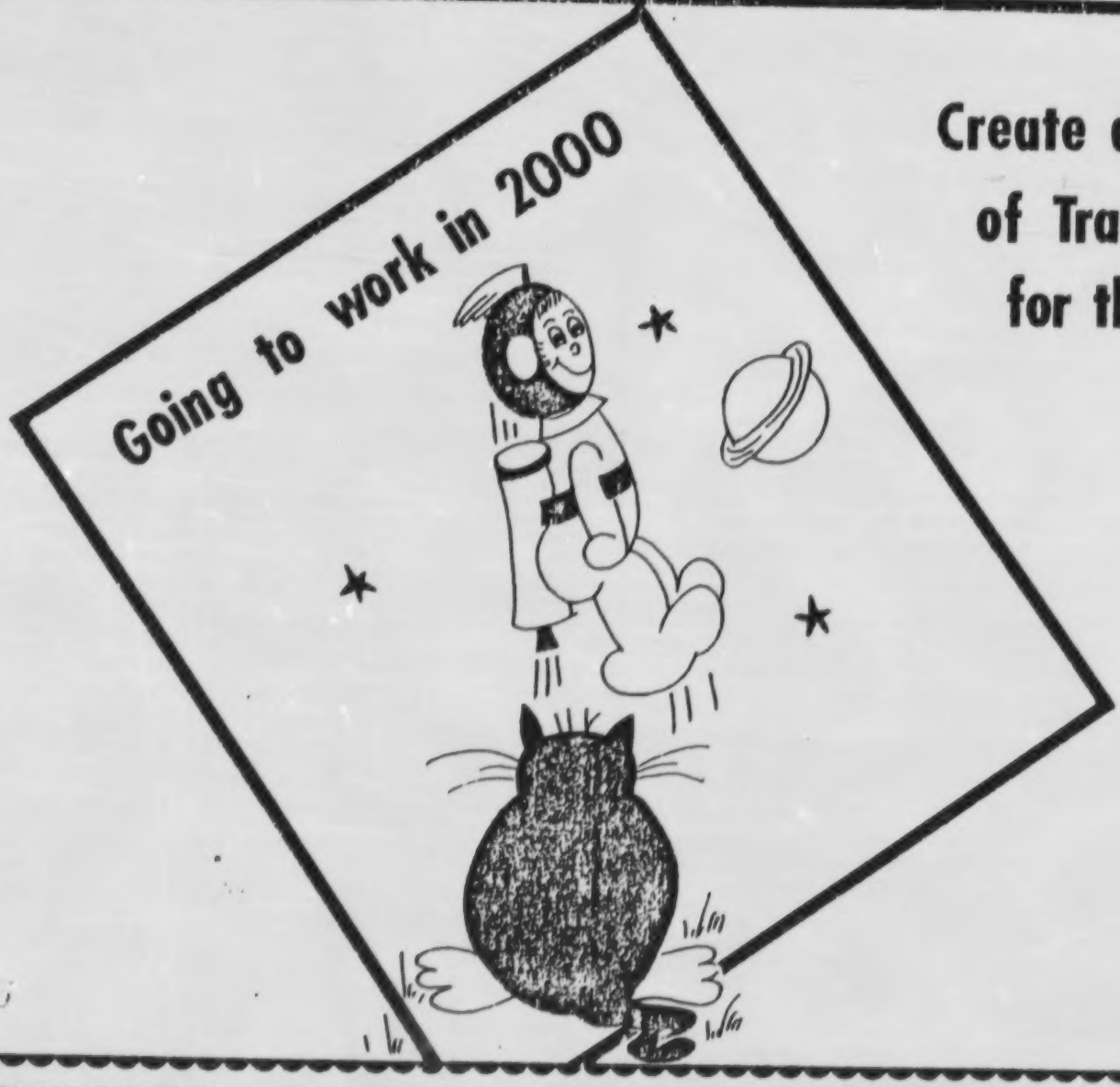
Recommended reading: Transportation in the World of the Future (I)

Film: "Mobility" in the series Dimensions of Change

with:







Create a Mode of Transportation for the Future.

153

156

© Copyright 1978 by Minneapolis Public Schools

Materials

Old magazines
Glue
Scissors
Paper
Pencil

Directions

After answering the discussion questions:

1. Cut out pictures of things moving.
2. Paste the pictures on paper.
3. Study your pictures and make a chart:

WHAT IS MOVING WHAT?		
foot muscle	moves " "	ball foot ....

Discussion

1. What is energy?
2. What kinds of energy are there?
   List as many kinds as you can.
3. Can energy change from one form to another?
   Give examples.
4. Can energy be stored? Give examples.
5. Where does energy come from?
   List as many energy sources as you can.
6. Which sources of energy will last for a long, long time? Which are in danger of being used up?
7. Which are our main sources of energy now?
8. Which sources do you think we will use in the future? Why?

More Ideas

What would happen if we ran out of oil right now? Do a futures wheel to find out.

To the Teacher

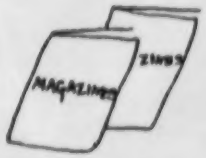
Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

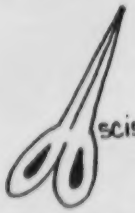
Note: Hold discussion before starting activity.

Recommended reading: Why Things Work -- A Book About Energy, Energy All Around

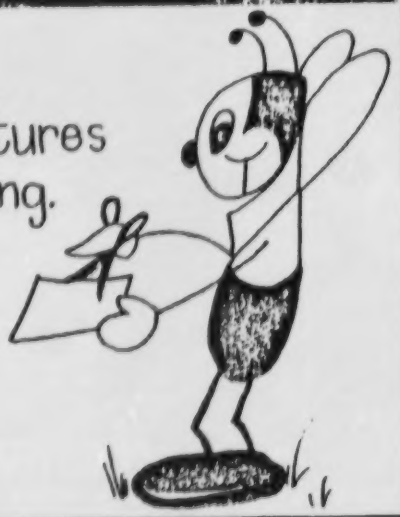
Film: "Energy" from series, Dimensions of Change

with:

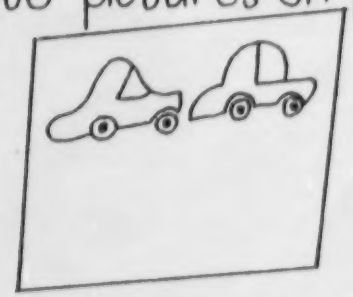




1. Cut out pictures of things moving.



2. Paste pictures on paper.



3. Tell what is moving what.

BEST COPY AVAILABLE

Materials

Construction paper
Wood scraps
Wooden spools
Dowels
Glue
String
Paper clips
Pins
Straws
Rubber bands
Weights
Balloons
Wax paper
Paper tubes
Fabric
Napkins

Directions

After answering the discussion questions:

1. See how many different kinds of wind toys you can make from materials you can find around the house or classroom. See if you can make something no one else will think of.

2. Shape paper airplanes differently and see which kind will travel farthest. Hold a paper airplane contest.

Discussion

1. What is wind?

2. What makes the wind blow?

3. Name some of the different kinds of winds.

4. When you look out the window, how can you tell if the wind is blowing?

5. What kinds of sounds can wind make?

6. Make a list of uses for wind.

7. What are some of the things that can be powered by wind energy?

8. How are some familiar wind toys like machines that use wind energy to do work?

9. How might wind energy be used in the future?

10. In the future, will we use more or less wind energy than we do today?

More Ideas

Cut out pictures showing the effects of wind and pictures of wind devices. Make a wind scrapbook or a wind mobile.

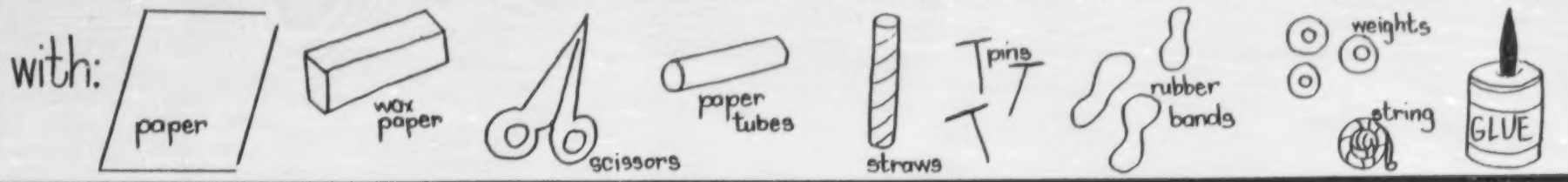
To the Teacher

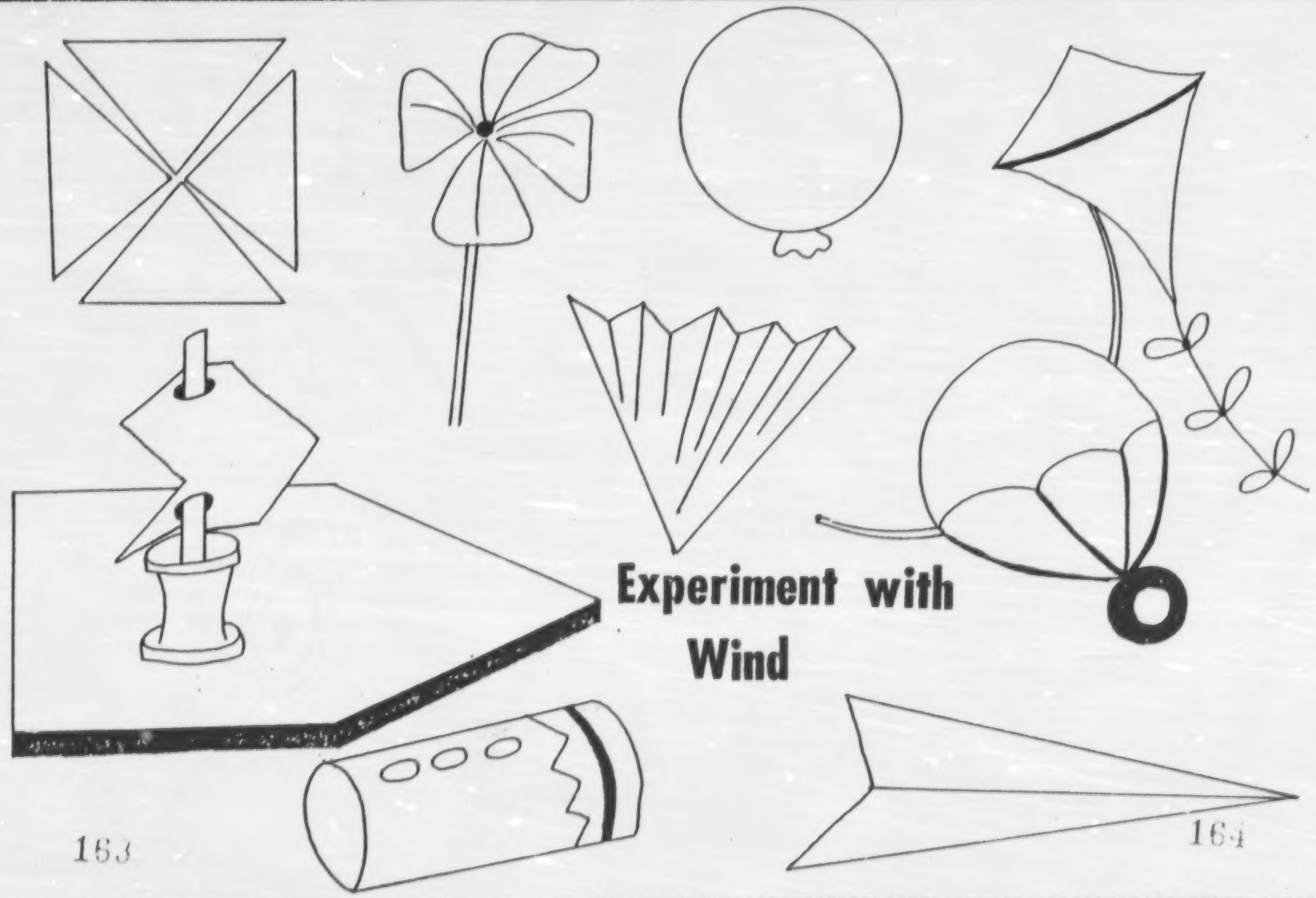
Note: Encourage innovation and experimentation!

Assemble materials in advance and wait for a windy day.

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Recommended reading: The Wind (E), Catch the Wind (H)
How to Make and Fly Paper Airplanes





Experiment with Wind

Materials

Old magazines and newspapers
Glue
Crayons
Scissors
Paper

Directions

1. Find as many pictures as you can of things that use energy from the sun.

2. Make a chart showing how the sun's energy is passed along in an energy chain.

Discussion

1. Explain the relationships between the pictures on your chart. Tell what is happening to what.

2. Can you see any similarities between the use of energy by living things and the way machines use energy?

3. Can you think of anything that does not use energy from the sun?

More Ideas

Display your chart on a bulletin board so that other people can see it.

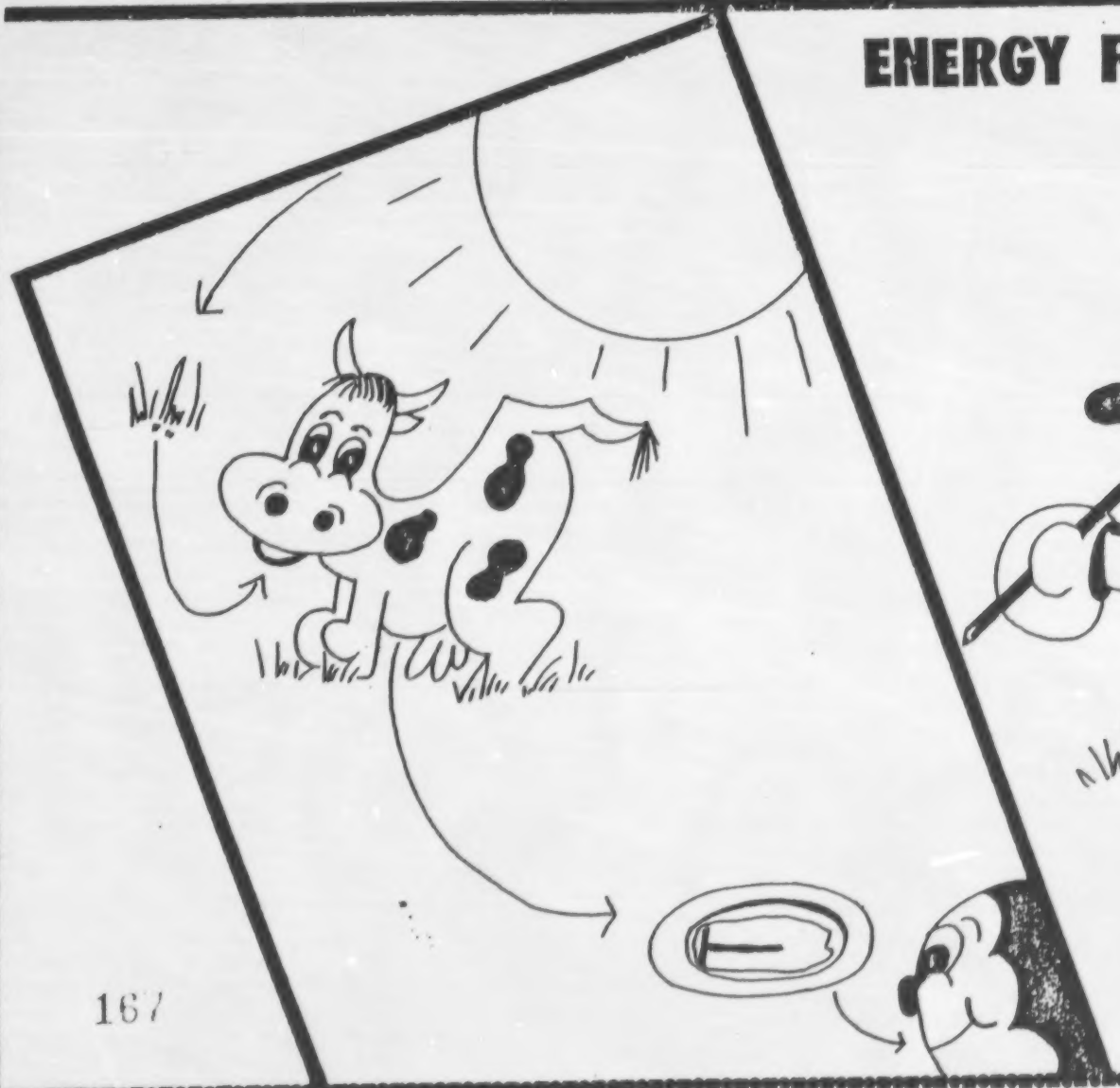
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply

Recommended reading: Energy from the Sun (E), Sun Power (E-I)

with: PAPER CRAYONS MAGAZINES GLUE scissors

ENERGY FROM THE SUN



BEST COPY AVAILABLE

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

Black construction paper
Corrugated cardboard
2 thermometers

Directions

1. Place each thermometer between a piece of construction paper and a piece of cardboard.
2. Place both sets of paper/cardboard in the sun, with the paper side up. Place one flat on the ground and the other at a sharp angle to the sun's rays.
3. Predict what will happen.
4. Read the thermometers after 10 minutes.

Discussion

1. Which thermometer had the highest reading? Why?
2. What was the difference between the two readings?
3. If you were building solar collectors for your home, how would you place them in order to collect the most heat?

More Ideas

1. Use different colors of construction paper.
2. Vary the degree of slant.

To the Teacher

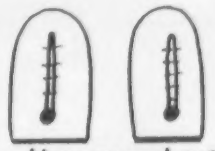
Skills: Memory, Translate-Interpret, Analyze-Apply

Note: Sunny day needed.

with:

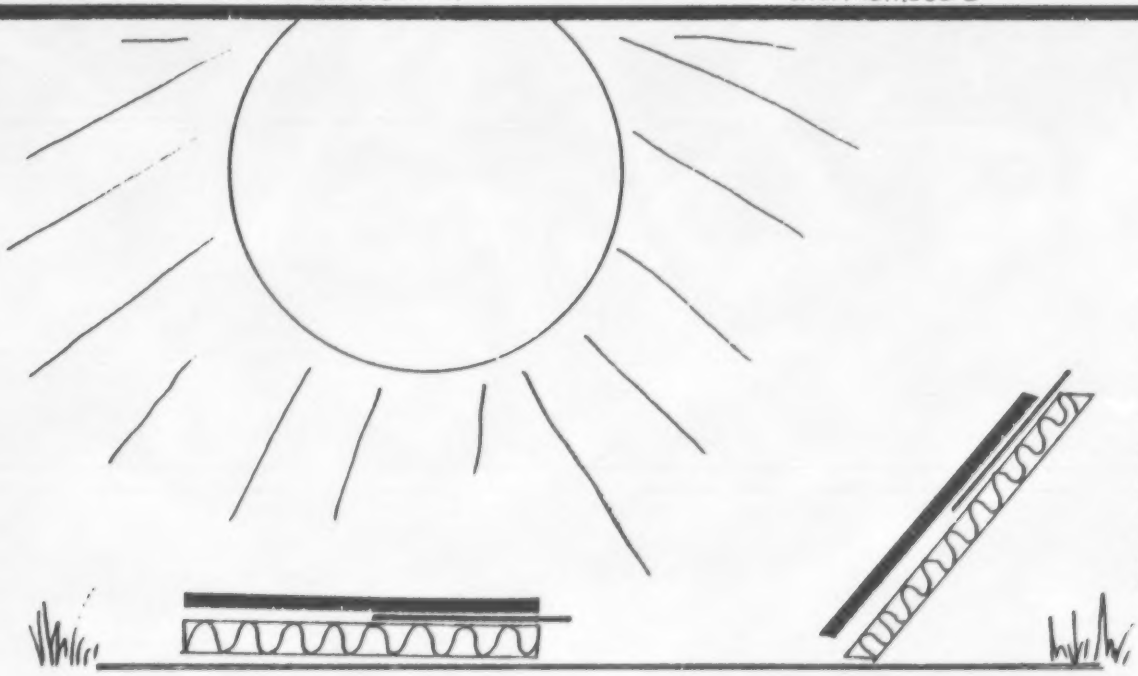
construction paper

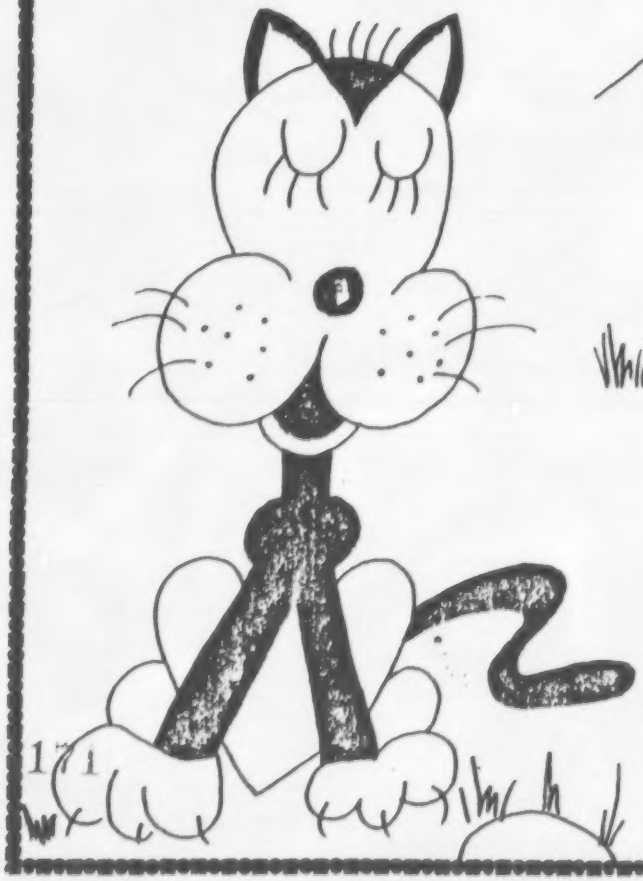
cardboard



thermometers

sun





How much more heat is produced by the direct rays of the sun than by its slanted rays?

MEASURING HEAT FROM THE SUN

BEST COPY AVAILABLE

Materials

Magnifying glass
Chair or stool
Masking tape
Timer
White paper
Pencil
(Wood scraps)
(Construction paper)

Directions

1. At 1:00 P.M., adjust the lens to best focus on a piece of white paper.
2. Tape the magnifying glass to the chair or stool in this position.
3. Draw a circle around the light on the paper.
4. Measure the time it takes for all the light to leave the circle.
5. Try the experiment at 9:00 A.M. and 3:00 P.M. Does it take the same amount of time for the spot of light to leave the circle? Why is this?

Discussion

1. What is the magnifying glass doing to the sun's rays?
2. What does this experiment tell you about the way reflectors and lenses for collecting solar energy must work?

More Ideas

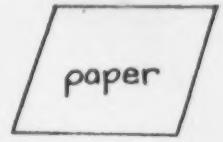
1. Use the magnifying glass to burn a design onto wood or construction paper. Try different colors of construction paper. Try different sizes of lenses.
2. Can you use a magnifying glass to boil water?
3. How would you construct a solar oven?

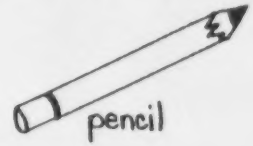
To the Teacher

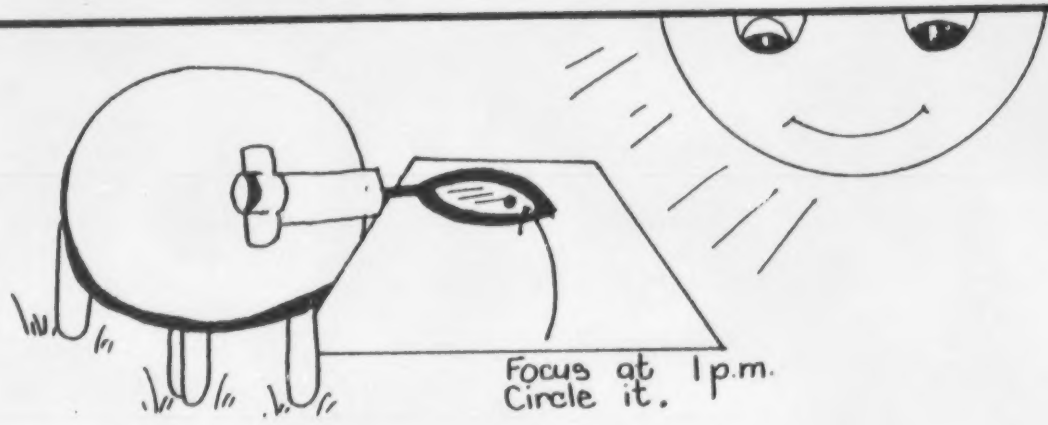
Skills: Memory, Translate-Interpret, Analyze-Apply

Note: Sunny day needed

with:







How Long Will a Magnifying Glass Focus in the Same Spot?

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education

Materials

2 cans of the same size
Black paint and brush or black construction paper
Water
2 thermometers

Directions

1. Paint the outside of one can black -- or tape black construction paper around it.
2. Fill both cans with the same amount of water.
3. Take the temperature of the water in each can. Record.
4. Place the cans in the sun. Predict what will happen to the water temperatures.
5. Take the temperatures after 15 minutes and again after 30 minutes. Record.
6. Was your prediction correct? Make a graph showing your results.

Discussion

1. What color was the can with the warmest water?
2. How does color affect water temperature?
3. What else might you do to increase the water temperature? Try out your ideas.
4. Tell how you might use what you have learned in designing a solar collector for your home.

More Ideas

1. Try wrapping one of the cans in aluminum foil -- or other materials, such as cotton or newspaper.
2. Vary the distance from the sun. Vary the angle of the sun.
3. Place a mirror so that it will reflect sunlight onto the can. Does reflected sunlight warm the water? Use more than one mirror. What effect does this method have on water temperature?
4. Make a graph showing all the variables and the results.

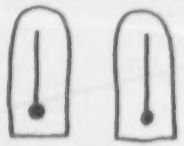
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply

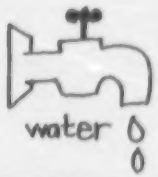
Note: Sunny day needed.

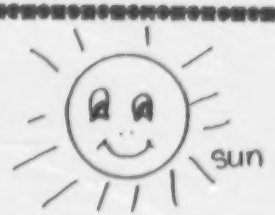
with:

cans


thermometers

brush


water

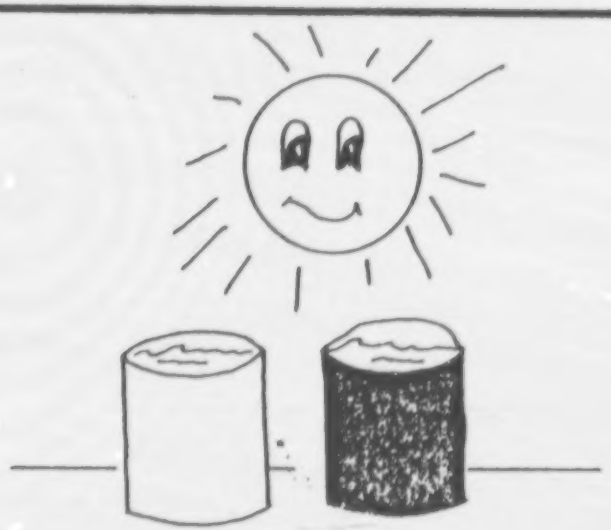

sun

1.

2.

BEST COPY AVAILABLE

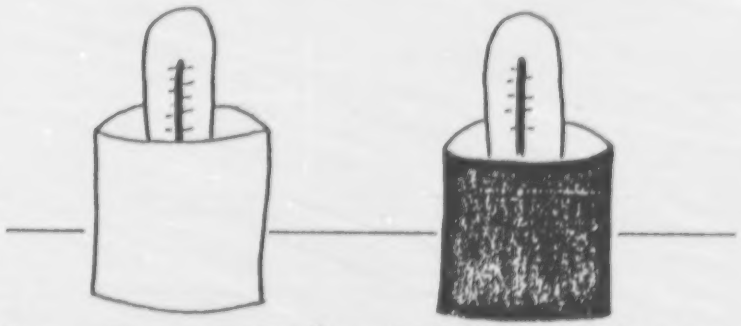
3.



173

4.

15 minutes? 30 minutes ?



How Does Color Effect Water Temperature?

189

© Copyright 1978 by Minneapolis Public Schools

Materials

Construction paper in several colors:
- white
- black
- red
- yellow
- blue

Timer

Ice cubes (make sure they're all the same size)

Directions

1. Place several pieces of different-colored construction paper in the sun.
2. Place an ice cube on each sheet of paper.
3. Set timer.
4. Record time it takes for each ice cube to melt.
5. Make a chart of your results.

Discussion

1. Which ice cube melted first? Why?
2. Which ice cube took the longest to melt? Why?
3. Would a house with a white roof be cooler than a house with a dark roof? Explain.
4. If you were building a house, which color roof would you put on it? Tell why.

More Ideas

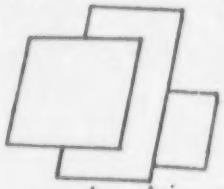
1. Try putting the paper on top of the ice cubes. Do you get the same results?
2. Try using tinfoil or wax paper, instead of construction paper.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply

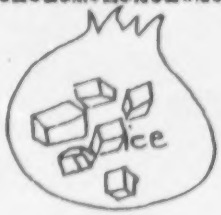
Note: Sunny day needed. This activity works best outside. Plan other activities while ice is melting.

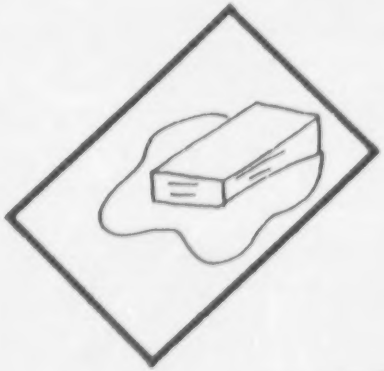
with:

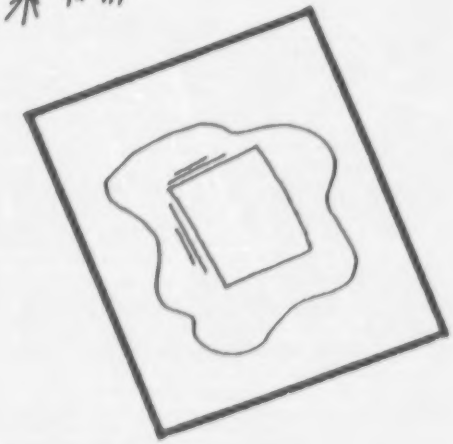


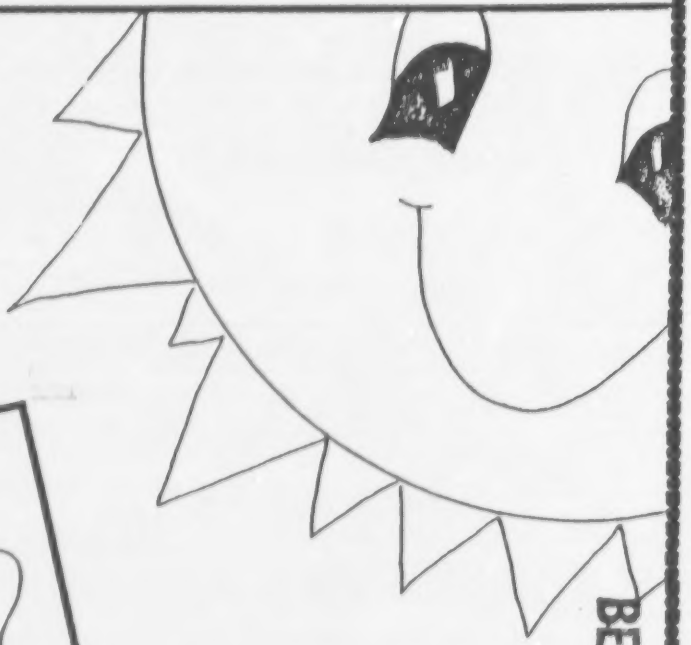
construction paper

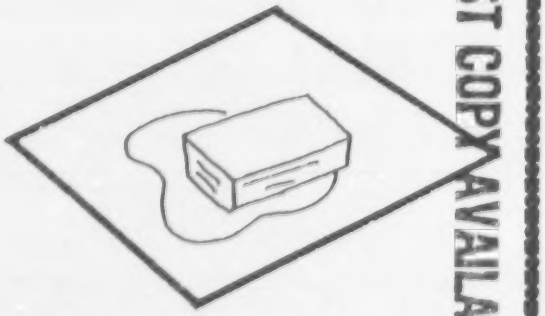
timer











What Color Absorbs the Sun's Heat Best?

BEST COPY AVAILABLE

Materials

Cardboard box with cover
Black paint or construction paper
4 small metal cans
4 thermometers
Sand
Salt
Water
Torn-up paper

Directions

1. Fill one can with sand, one with salt, one with water, and one with paper.
2. Place a thermometer in each can and record the temperature.
3. Paint the box black or cover it with black paper. Put the cans in the box.
4. Place the closed box in the sun for ½ hour.
5. Remove the cans and record the temperature of each can. Keep track of the time it takes for each one to return to the starting temperature.

Discussion

1. Which temperature fell fastest? Which fell slowest? Why?
2. Which material stores solar heat best? Why?
3. What are some of the advantages of heating a house with solar energy? What are some of the disadvantages?
4. How could some of the problems be solved?

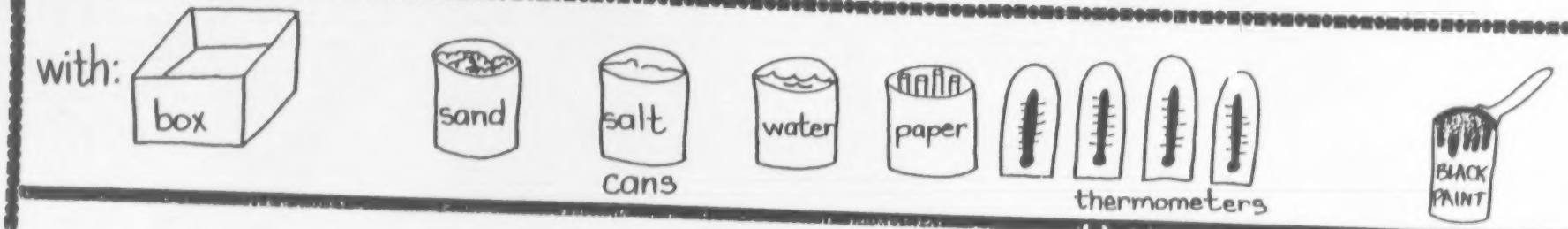
More Ideas

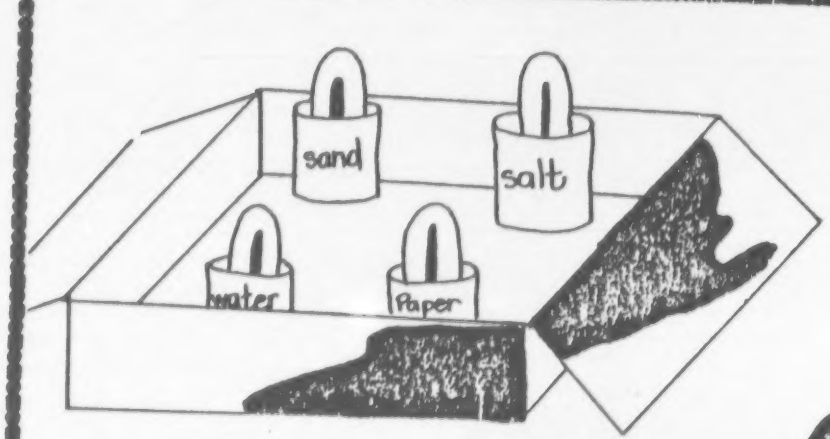
1. Fill the cans with other materials, such as sugar, jello, flour, dirt. See how long it takes for each material to return to the starting temperature.
2. Find out what material people use for storing solar heat in their homes.

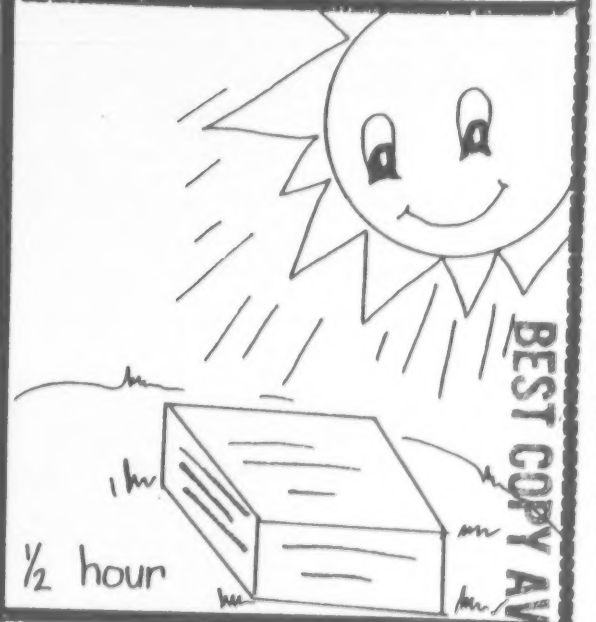
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate.

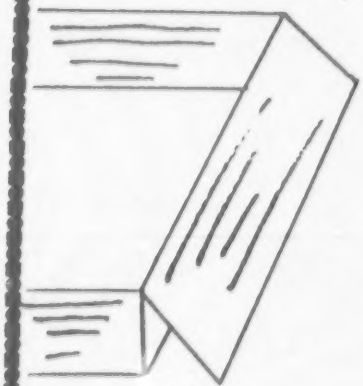
Note: Sunny day needed. Work in small groups.

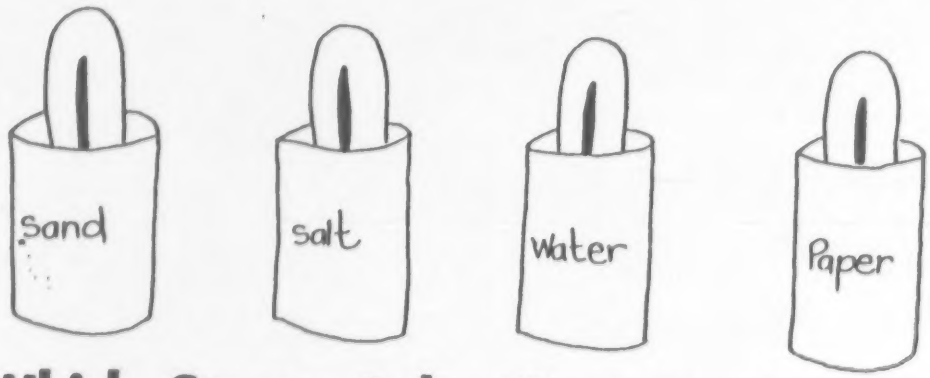


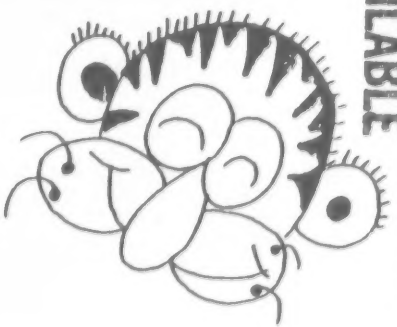




BEST COPY AVAILABLE







187

Which Stores Solar Heat Best?

188

© Copyright 1979 by Minneapolis Public Schools

Materials

Large disposable pie pan
Small disposable pie pan
Black paint and brush
2 thermometers
2 cups
Water
Plastic wrap
Tape
Newspapers

Directions

1. Paint the pans black.

2. Fill both with the same amount of water.

3. Cover with plastic wrap. Secure with tape.

4. Place pans on newspapers in the sun for 10 minutes.

5. Pour water from pans into separate cups. Note temperature.

Discussion

1. Which pan was warmer? Why?

2. What purpose did the newspapers serve? Why is this important?

3. In collecting solar energy, is bigger better?

4. How could you use this information in designing a solar collector for your home?

More Ideas

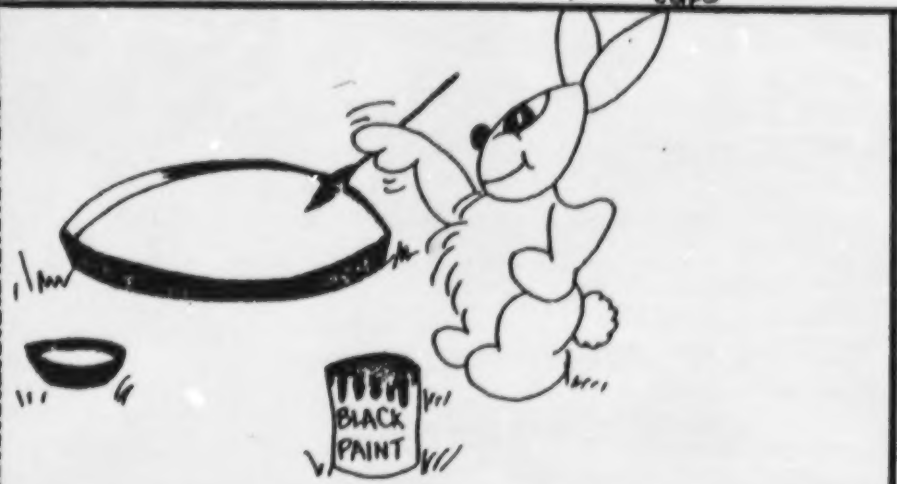
1. Refill the large pan and heat it to the former temperature by using a candle.
   How much did the candle cost?
   How much did the solar energy cost?

2. Visit a solar-heated home or building.
   Does it cost more to heat a home with solar energy than to heat with oil or gas?
   In the future, is solar heating expected to cost more or less than it does today?
   What are the problems connected with solar heating?
   How could these problems be solved?

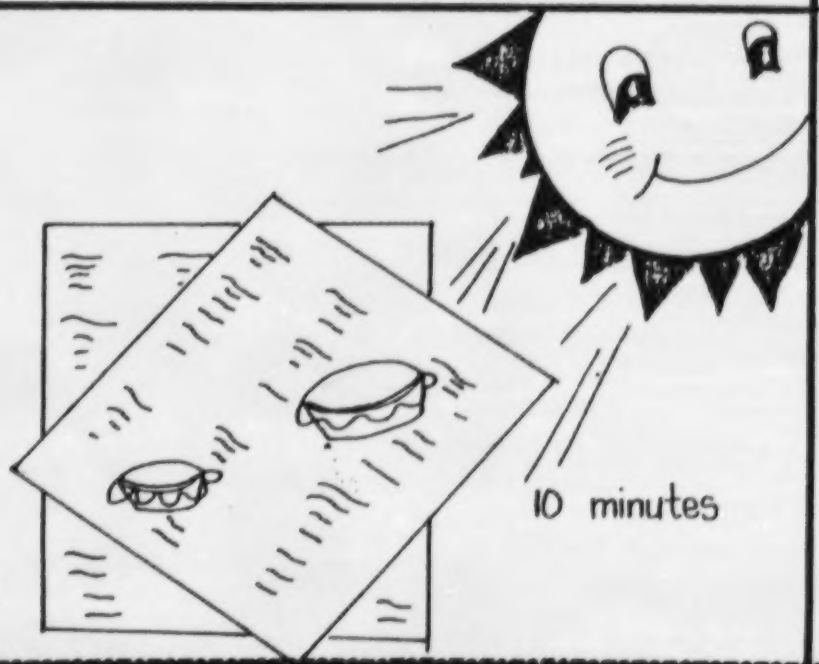
To the Teacher

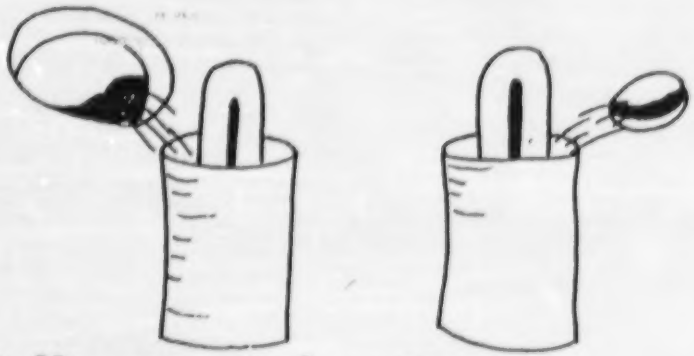
Skills: Memory, Translate-Interpret, Analyze-Apply

Note: Sunny day needed.



BEST COPY AVAILABLE





In Collecting Solar Energy, is Bigger Better?

Materials

Large pan or bowl
Clear plastic wrap
Rock
Masking tape
Muddy water
Drinking cup or glass
Ruler

Directions

1. Fill the pan with muddy water to a depth of 5 cm.

2. Place drinking cup in the middle of the pan. (You may have to weight the cup so it doesn't float around.)

3. Cover the top of the pan with plastic wrap and tape the wrap to the pan.

4. Place a rock on the plastic wrap. The rock should be heavy enough so the wrap sags in the middle but doesn't break.

5. Place the pan in the sun.

Discussion

1. What is forming on the plastic wrap? Why is this happening?

2. How much water is in the cup after one hour? After two hours? By the end of the day?

3. How could we use this information in helping to solve a problem of the future?

More Ideas

1. Try this experiment with salt water.

2. Visit a water purification plant.

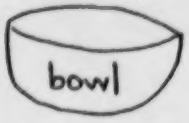
To the Teacher

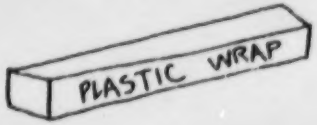
Skills: Memory, Translate-Interpret, Analyze-Apply, Create

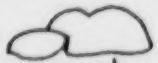
Note: Sunny day needed

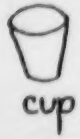
Recommended reading: Clean Air - Clean Water for Tomorrow's World (I)

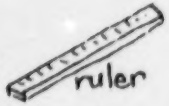
with:

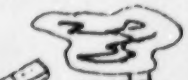




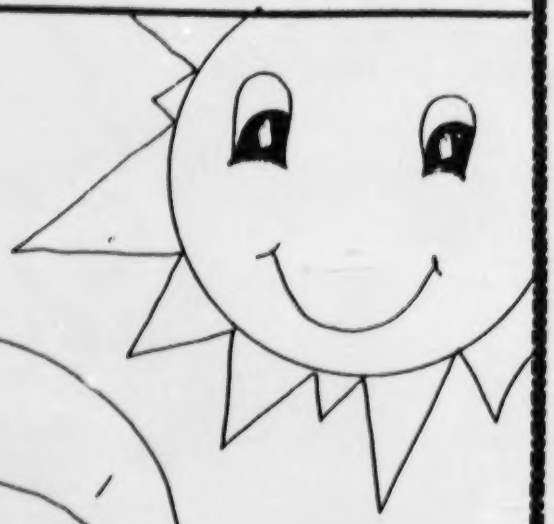


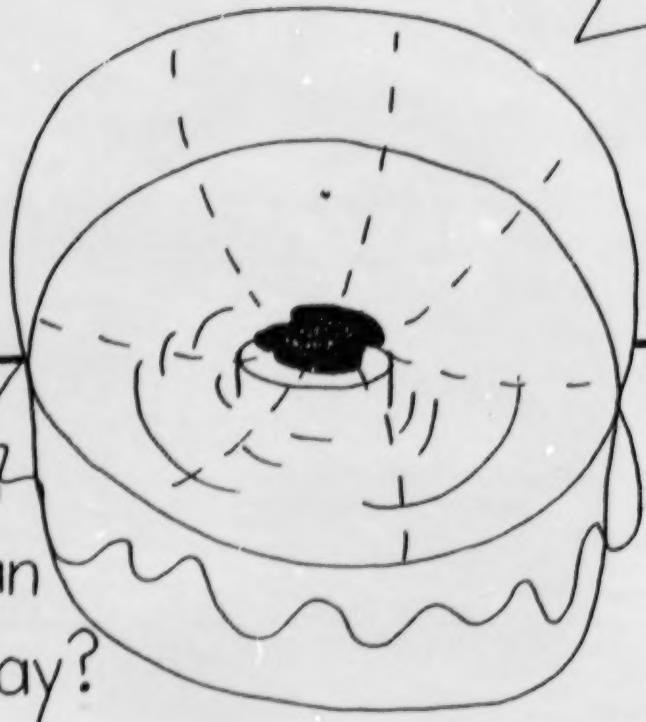






CLEAN WATER





How much clean water can the sun get out of a pan of muddy water in one day?

BEST COPY AVAILABLE

Materials

4 unwaxed paper cups
White paper
Black paper
Plastic wrap
Foil
Tape
Scissors
Newspapers

Directions

1. Line the inside of 2 cups with black paper.
2. Place a slice of apple in each cup and cover the cups with plastic wrap.
3. Make two large white paper cones. Line one with foil. Wrap a cone around each of the cups.
4. Place each cone and cup inside another cup to hold them together.
5. Stuff newspaper between the cones and outside cups.
6. Place the cookers in the sun.
7. When the apples look cooked, taste to see which cone cooked better.

Discussion

1. Which cooker worked best? Why?
2. What kind of energy did you use to cook your apple?
3. How much did the energy cost?
   How much would it cost to use another form of energy to do the same job? Call your power company to find out.
4. What are the advantages of using solar energy for cooking? What are the disadvantages? How could the problems be solved?

More Ideas

1. Repeat the experiment with other foods, such as potatoes.
2. Use mylar instead of aluminum foil.
3. Hold or tape a mirror to focus the sun's rays.

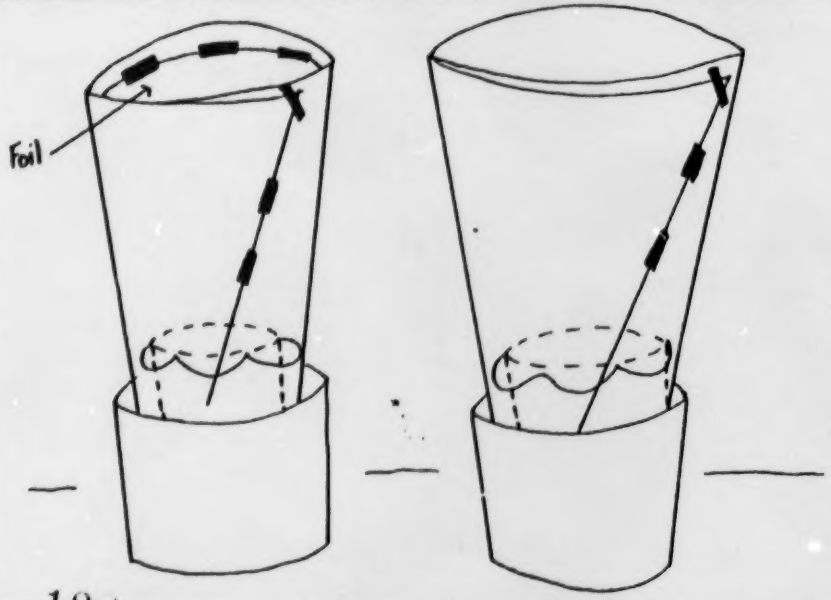
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

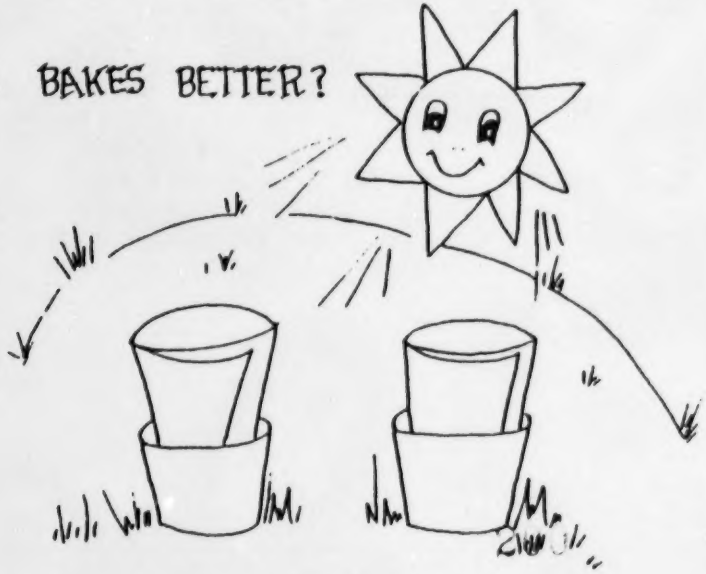
Note: Sunny day needed. Experiment must be done outside. Allow plenty of preparation time.

with:

MAKE A SOLAR COOKER



WHICH BAKES BETTER?



BEST COPY AVAILABLE

Materials

Paper
Pencil

Directions

1. Make a list of all the machines in your home.

2. Make a chart showing:
   a. the kind of work each machine does
   b. how the work would be done if the machine didn't do it.
   c. how much time it takes each machine to do its work.
   d. how much time it would take to do the work without the machine.
   e. what kind of energy each machine uses.

Discussion

1. Are there any machines you could easily do without?

2. If you could keep only 3 machines, which would you choose?

3. What if there were no machines to do work in your home? How would each member of the family be affected? Do a futures wheel. Rate the consequences plus or minus. Would your life be more or less pleasant without the machines?

More Ideas

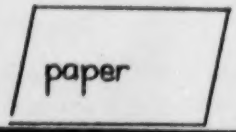
1. Call your power company. Find out how much it costs each month to run all the machines in your home. How could you reduce these costs?

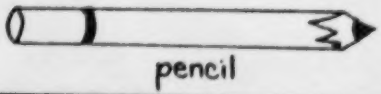
2. Test the noise level of the machines in your home with an audiometer. Are there people in your city who control noise? Make a list of all the things you can do to lessen noise.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with:





MAKE A LIST

BEST COPY AVAILABLE

© Copyright 1978 by Minneapolis Public Schools

Materials

Paper
Pencil

Directions

1. Do an energy check on your home.
   Make a chart:

	ENERGY CHECK		
Room	Windows	Doors	Floor
Kitchen	1 OK	1 OK	linoleum
	1 needs shade		

Count the number of windows and doors in each room. In the top box in each square, write the number of doors or windows that are well-insulated. In the bottom box, write the number that need weather-proofing. Tell what needs to be done.

Things to check:

Windows:
- Shutters that close?
- Curtains that open and close?
- Shades?
- Storm windows or thermopanes?
- Putty in the cracks?

Doors:
- Weatherstripping?
- Air coming in?

Floors:
- Wood floors?
- Linoleum?
- Rugs?

2. Call your power company. Ask what your family would save in heating or cooling costs if your house were better weather-proofed.

Discussion

Discuss your chart with your parents. Tell them how much money they would save if your house were better weather-proofed.

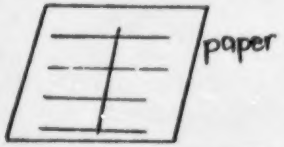
More Ideas

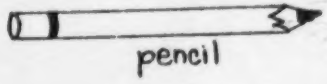
For more energy-saving ideas, see The Do-It-Yourself Environmental Handbook.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with:





MY HOME.....ENERGY CHECK

	WINDOWS	DOORS	FLOOR & CEILINGS
KITCHEN			
LIVING ROOM			
DINING ROOM			
BATHROOM			
BEDROOMS			

207

208

BEST COPY AVAILABLE

Materials

Paper
Pencil

Directions

1. Review ground rules:
   Every answer is acceptable.
   You always have the right to pass.

2. Divide the class into small groups of 4-6 people.

3. Allow plenty of time for individual group discussion.

4. Share results from each group.

Discussion

1. What would happen if these agencies were closed? Do a futures wheel to find out. Evaluate the consequences.

2. Which might cause an energy crisis?

3. Do you think an energy crisis is likely to occur? If so, when?

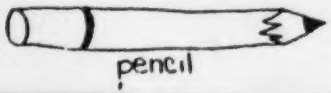
4. What could be done to prevent such a crisis?

More Ideas

Call your city or town hall to find out if any plans have been made for coping with an energy emergency.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

with paper 

SIMULATION GAME

Rules: You are a member of an energy control board.
Your town is in an energy crisis.
List 3 agencies you would close.
List 3 agencies you would keep open.

Restaurants
Elementary Schools
High Schools
Colleges
Retail Stores
Hospitals, Clinics, Doctors Offices
Goverment Offices (police, fire, city, state, county)
Factories
Movies
Bars
Bowling
Ballrooms

Materials

Encyclopedia
Paper
Pencil

Directions

1. Make a scrapbook or a time line tracing the development of something from the past to the present.
   Some items you might want to investigate:

car	computer
airplane	clock
iron	easy chair
vacuum cleaner	toilet
stove	refrigerator
typewriter	washing machine
radio	bicycle
swimming suit	television

   a. To find out what the item was like in the past, look in the encyclopedia and ask older people.

   b. Draw pictures showing how the item looked at various stages of development.

   c. Date each picture and add a title or short explanation.

   d. Make a scrapbook or place the pictures on a time line.

2. How is this item likely to change in the future?
   a. List changes and possible dates.

   b. Draw pictures showing how it might develop.

   c. Add these pictures to your scrapbook or time line.

Discussion

1. What caused the changes in the item you studied?

2. Have the changes been good or bad?

3. How might desirable changes be made in the future?

More Ideas

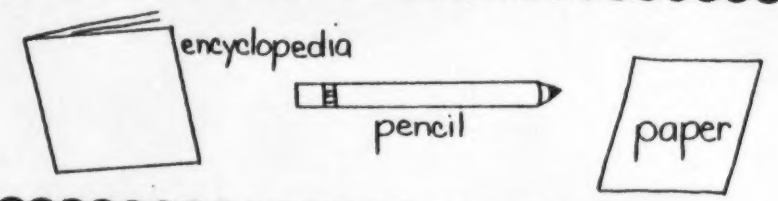
Visit a museum.

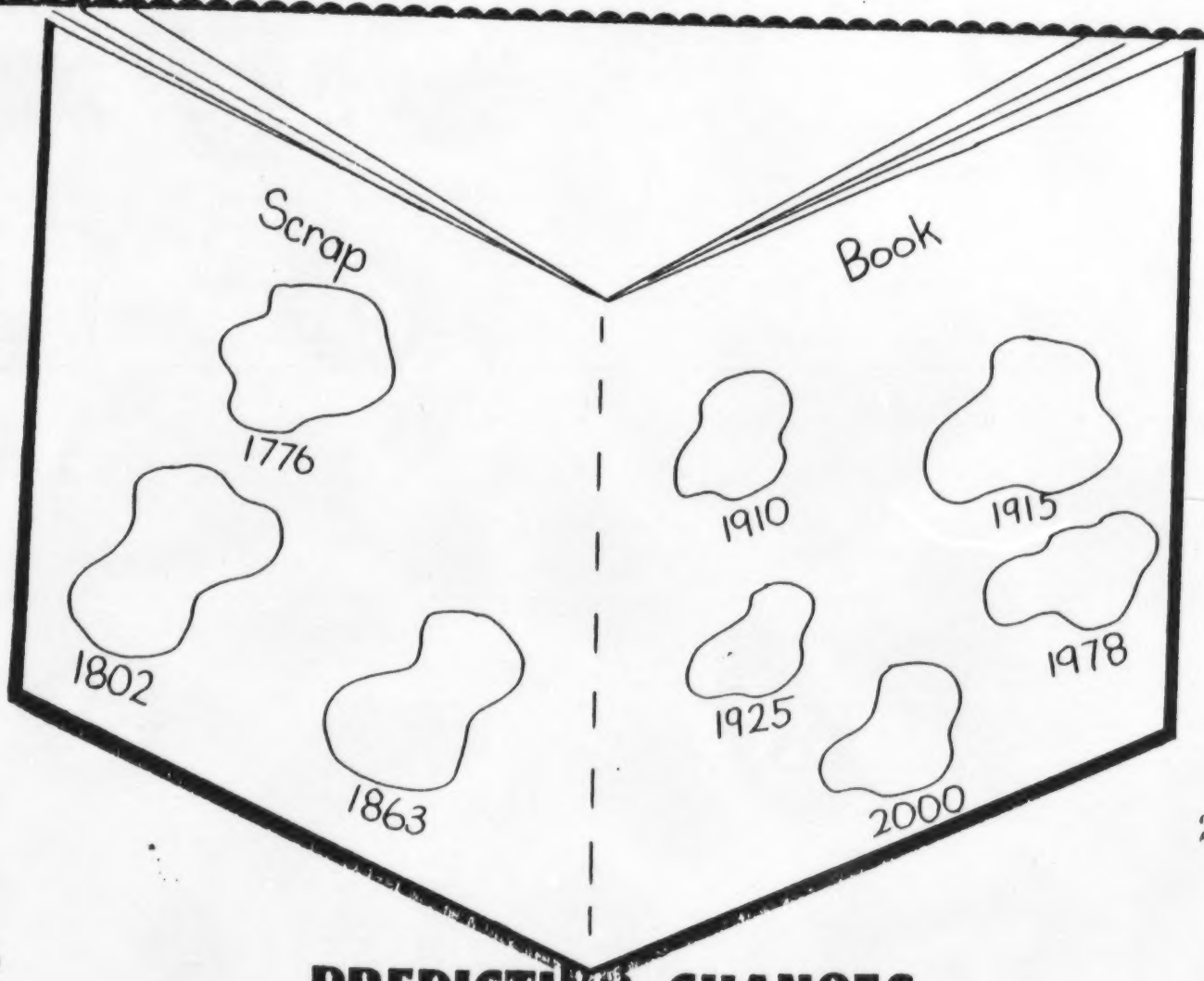
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: If any students have seen the General Electric presentation at Disneyworld, a report on this can start the discussion.

with:





215

215

PREDICTING CHANGES

Materials

Paper
Pencil
Crayons
Magazines
Newspapers
Pictures of old things

Directions

Rewrite or draw the item you have chosen.

Discussion

1. Share your drawing with the rest of the class.
2. What might cause the changes you've made?
3. Will these changes be good or bad?
4. Could the bad changes be prevented?
   How could we make the good changes happen?

More Ideas

Visit a museum.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: Look for materials well ahead of time.

with :

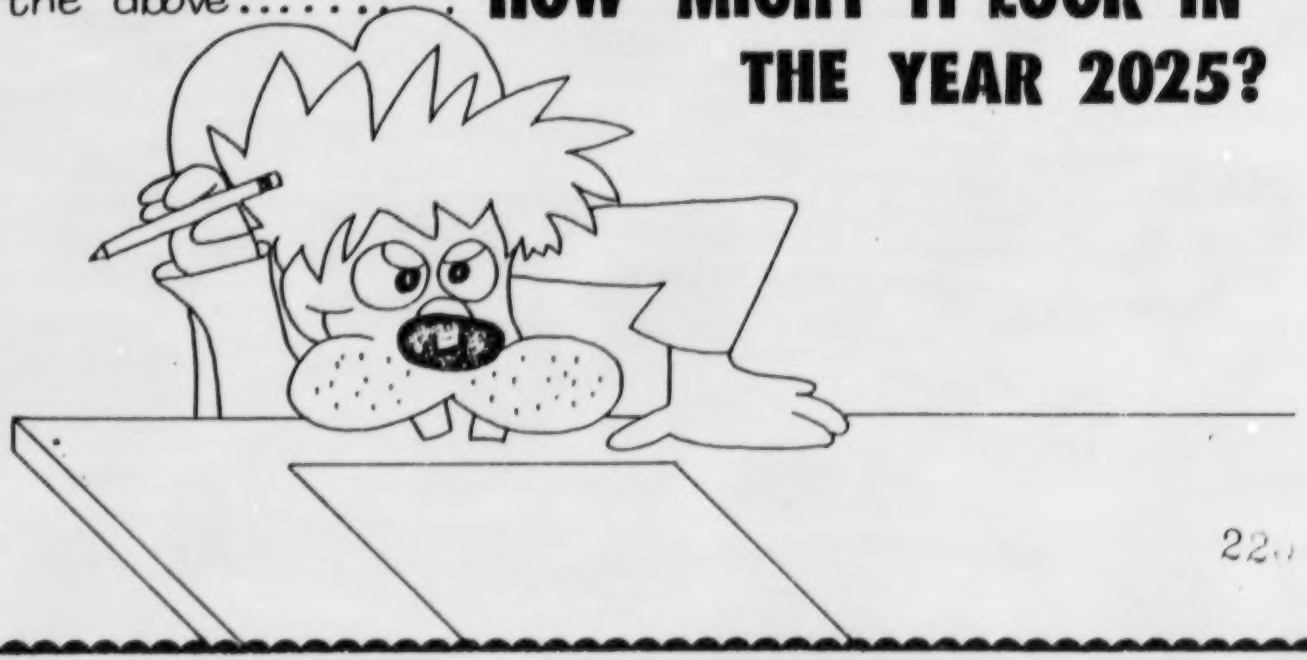
Look at old ads for cars, fashion, furniture .....

Look at old comics

Look at old radio program schedules

Look at old news reports

Using one of the above..... **HOW MIGHT IT LOOK IN THE YEAR 2025?**



Materials

All kinds of scrap materials, such as:
- Wood
- Styrofoam
- Tubes
- Paper
- Fabric
- String
- Plastic wrap
- Foil
- Maccaroni
- Pipe cleaners

Scissors
Paper
Crayons
Glue

Directions

1. Design a future thing-a-majig.
2. Write an ad for your thing-a-majig or describe it orally to the class.

Discussion

1. What does your thing-a-majig do?
2. Who uses it?
3. How much does it cost?
4. Do lots of people have them?

More Ideas

Write or tell a story involving your thing-a-majig.

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate.

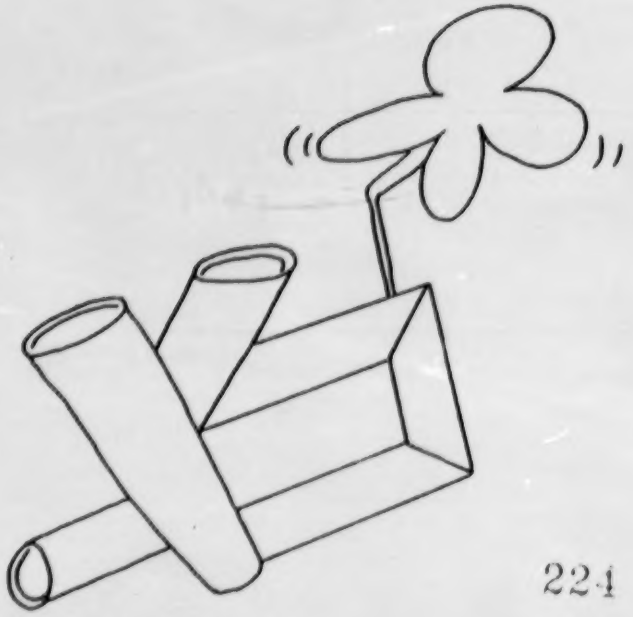
Note: Have children work in groups of two.

Use as a weekend project.

with:

Design a Future THING-A-MAJIG.

223


224

Materials

Paper
Pencil
Space to practice

Directions

1. Design an athletic game to be played by two persons in an enclosed area 3m x 3m x 3m:

   Decide on rules for the game.

   Design the playing area.

   List any equipment or accessories which are necessary for the game.

2. Demonstrate your game or teach someone else how to play it.

Discussion

1. Do you think your game might be popular in the future?
2. Who will play it?
3. Will anyone watch?
4. Why might people be interested in playing your game?

More Ideas

1. Draw a picture of someone playing your game at some future time.
2. Play a game from the book, New Games.

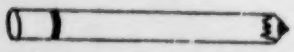
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

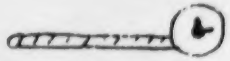
Note: Since there is a possibility of extended space travel and a need for better use of land on earth, this type of mini-athletic contest may become a necessity in the future.

Recommended reading: New Games

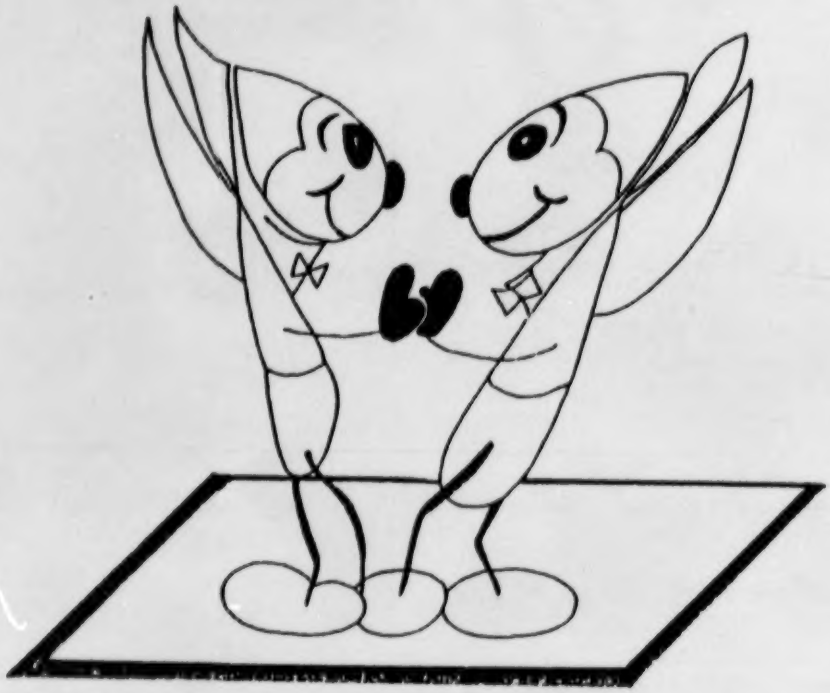
with: paper



pencil



tape measure.



DESIGN A GAME

227

228

Materials

Paper	(Cardboard)
Pencil	(Clay)
Crayons	(Wire)
Magazines	(Straws)
Newspapers	(Scrap wood)

Directions

After answering the discussion questions,

1. Take an advertisement page from a newspaper or magazine and re-design the articles, prices and descriptions for 20 years in the future.

2. Design a new sort of future product, including its package, if any. Give a commercial for your product. Tell what it will do. Describe its advantages and special features.

Discussion

Twenty years from now:

1. Will people be richer or poorer?

2. What kinds of homes will people have?

3. Will more or less work be done by machines?

4. What kinds of machines will people have in their homes?

5. Will people still have cars? How will they get from place to place?

6. What kinds of schools will children attend? Will adults go to school, too?

7. What kinds of jobs will people do? Will everyone work?

8. Will there be more old people ... adults ... children than there are today?

9. What will people do for fun?

10. Will there be any new kinds of medicines or health products?

More Ideas

1. Share your ideas with the rest of the class.

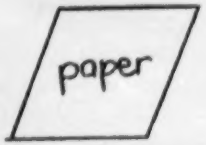
2. Combine all the ideas in a future products book.

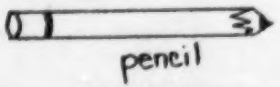
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create

Note: Hold discussion before starting activity.

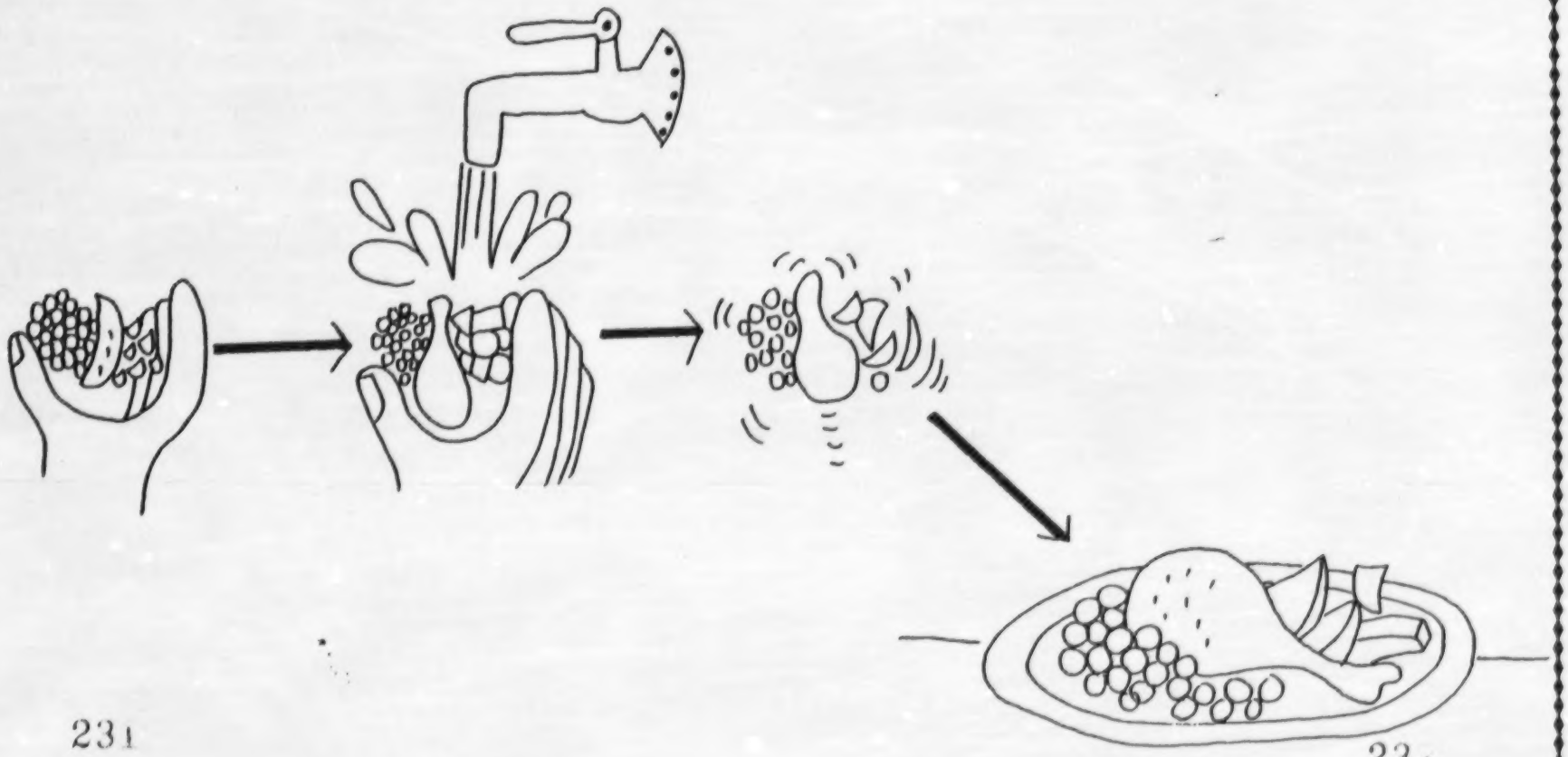
with:





MAGAZINES

DESIGN A FUTURE PRODUCT



231

232

Materials

Paper
Pencil
(Posterboard)

Directions

1. Interview your parents, grandparents, and older brothers or sisters to find out what slang expressions were popular when they were your age.

2. Make a chart showing how these expressions change.

Discussion

1. Try to find out where some of the slang expressions came from.

2. Why do slang expressions change?

3. Do people all across the country use the same slang expressions? Why or why not?

4. Will everyone use the same expressions in the future?

More Ideas

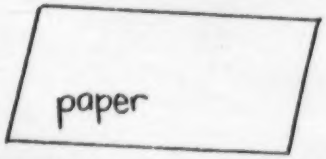
Make up some slang expressions which people might use in 2025.

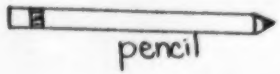
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create

Note: This activity is most fun when done as a group. A report on the activity makes an interesting feature for a school magazine or newspaper.

with:





How did they say it?

1920's	1930's	1940's	1950's
	Cat's Meow		Cool
Bee's Knees		Right On	
	Holy Cow		
		Split Chick	Keen
			Neato

How Might They Say It?

Materials

Comic strips
Paper
Pencil
Crayons

Directions

After answering discussion questions:

1. Draw your favorite comic strip character as this character might appear in the year 2000.

2. Draw a whole comic strip as it might appear in the Sunday newspaper in the year 2000.

Discussion

If your comic strip story took place in the year 2000 ...

1. Where might the action take place?

2. What might the houses and cars look like?

3. How would people be dressed?

4. Would there be any new characters in the strip? Any new machines? Any new products?

5. Would the characters be doing different kinds of things?

More Ideas

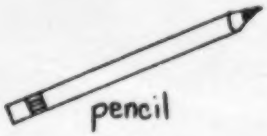
Look at old comic books or a history of comics, such as The Smithsonian Collection of Newspaper Comics. What sorts of changes have taken place in the comics through the years?

To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create

Note: Hold discussion before starting activity.

with:



Update Your Favorite Comic Strip Character to the Year 2000.

*cut and paste characters from Sunday comics.

© Copyright 1978 by Minneapolis Public Schools

Materials

Paper
Pencil
Ditto masters

Directions

Write a newspaper of the future. When the newspaper is finished, duplicate it so everyone in the class can have a copy.

Discussion

1. Will newspapers exist in the future? Will this be good or bad?

2. How might future newspapers be different than newspapers today?

3. What are some other sources of news besides newspapers? In the future, will these news sources be more or less important than they are today?

More Ideas

1. Visit the public library or historical society and look through some old newspapers. Compare them to the newspapers people read today.
   How have newspapers changed?
   In what ways have they remained the same?

2. Write 10 newspaper headlines for the year you will turn 30.

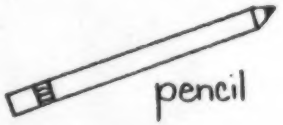
To the Teacher

Skills: Memory, Translate-Interpret, Analyze-Apply, Create, Evaluate

Note: This is a good summing-up activity for a futures unit.

Film: "Communications" from the series, Dimensions of Change.

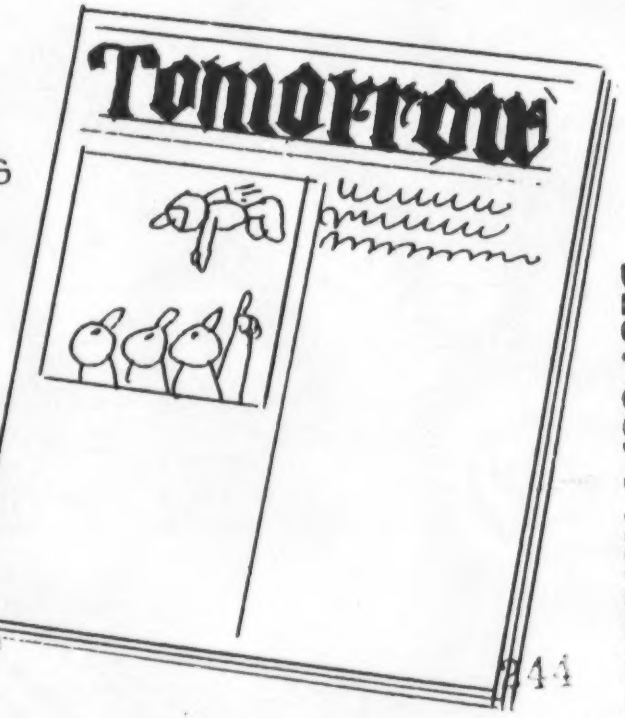
with:



Write a Newspaper of the Future.....

include:

- cartoons
- advertisements
- stories
- articles



243

244

BEST COPY AVAILABLE

© Copyright 1979 by Minneapolis Public Schools

Minnesota Council on Quality Education